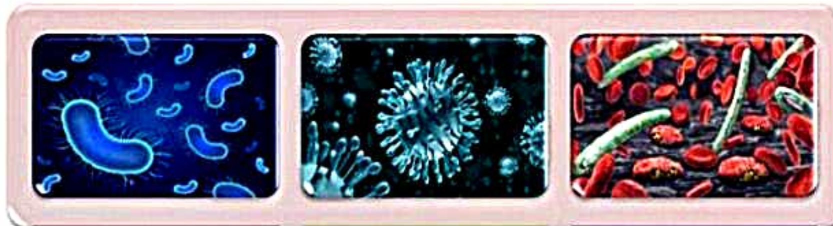
Class 8TH Unit – I Science

Microorganisms: Friend and Foe

INTRODUCTION:

- Microorganisms are too small and are not visible to the unaided eye.
- They are found in air, soil, water and in the bodies of plants and animals.
- Microorganisms play an important role in our lives. Some of them are beneficial in many ways whereas some others are harmful and cause diseases.
- Some microorganisms can fix nitrogen from air into soil and increase the soil fertility.

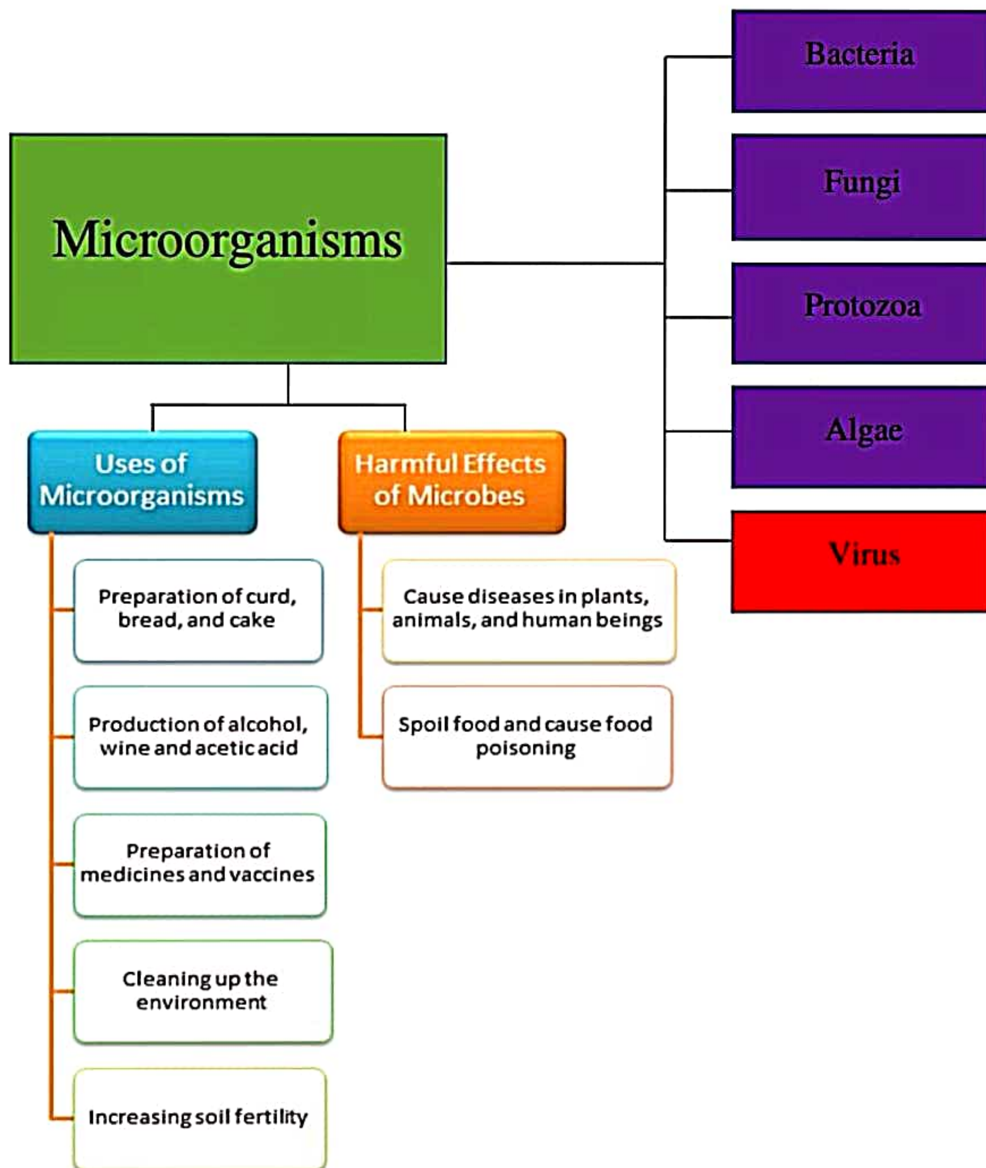


Bacteria: These are single-celled organisms with a rigid cell wall. They can only be seen under a microscope which enlarges images from 100 to 1000 times.

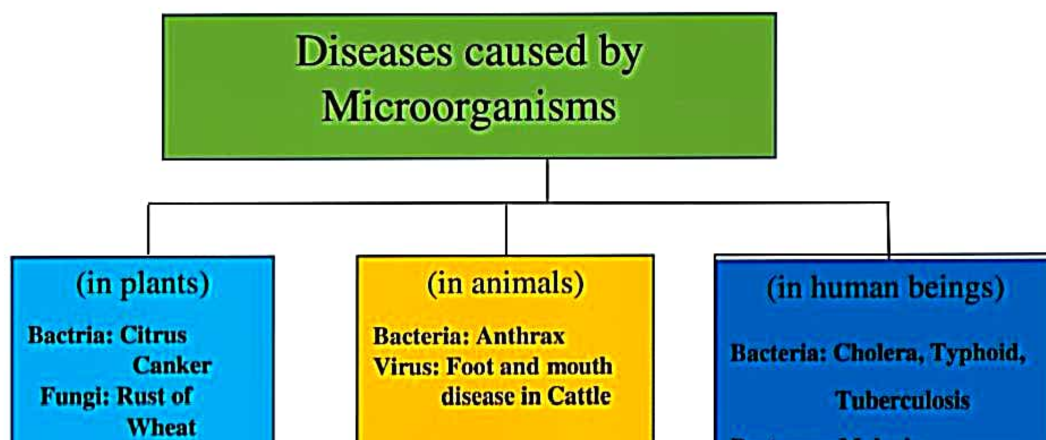
Fungi: These are non-green plants and hence, cannot make their own food. They either live as parasites (deriving nutrition from host organisms, or grow on the organic matter (such as bread mould).

Algae : These are simple plant- like organisms which are usually aquatic in nature. They contain a cell wall and chlorophyll and can make their own food by photosynthesis. Algae can be unicellular or multicellular. Some of the common examples are diatoms, *Chlamydomonas*, and seaweed.

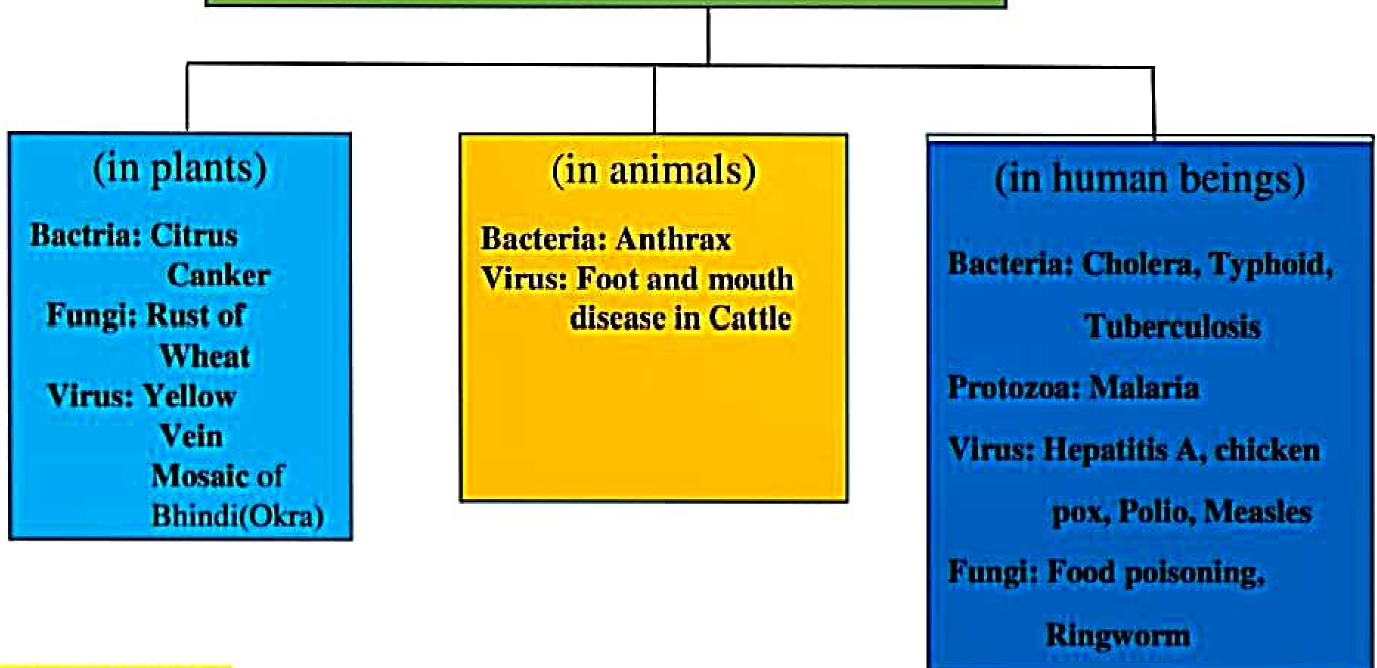
Protozoa: Protozoa are unicellular are organisms. Some of them live independently while others live as parasites. Many of the parasitic protozoan cause diseases in plants, domestic animals, and human beings. Example of some protozoan are *Amoeba, Plasmodium* and *Paramecium*



Microorganisms
Bacteria
Fungi
Protozoa
Algae
Virus
Uses of Microorganisms
Preparation of curd, bread, and cake
Production of alcohol, wine and acetic acid
Preparation of medicines and vaccines
Cleaning up the environment
Increasing soil fertility
Harmful Effects of Microbes
Cause diseases in plants, animals, and human beings
Spoil food and cause food poisoning



Diseases caused by Microorganisms
(in plants)
Bactria: Citrus Canker
Fungi: Rust of Wheat
(in animals)
Bacteria: Anthrax
Virus: Foot and mouth disease in Cattle
(in human beings)
Bacteria: Cholera, Typhoid, Tuberculosis



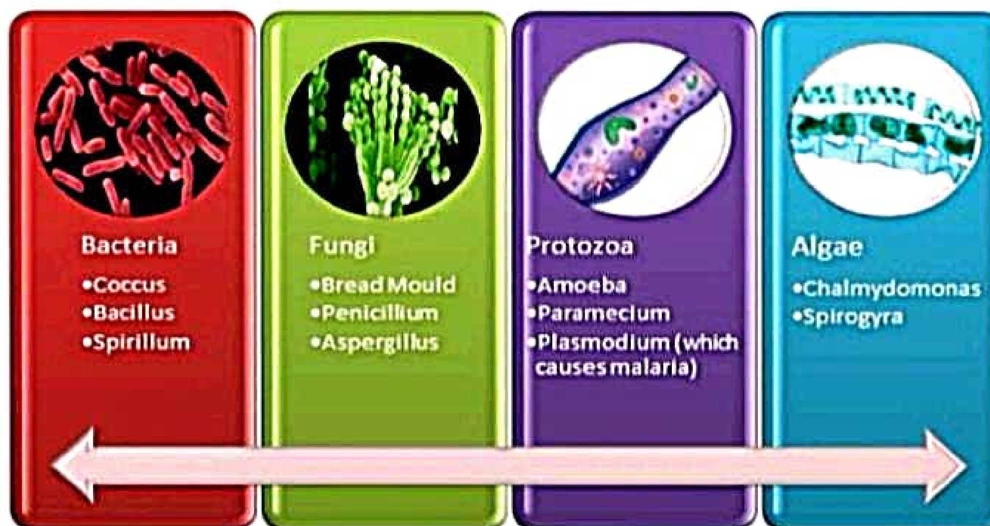
EXPLANATION

Microorganisms:

Organisms that are so small that they can only be seen through a microscope are called microorganisms or microbes.

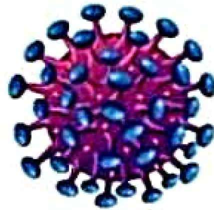
The study of microorganisms is known as microbiology.

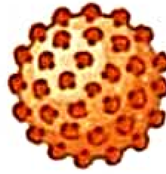
There are four major types of microorganisms:



Viruses:

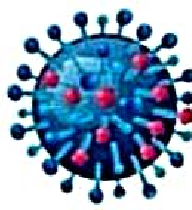
- Viruses are also microscopic.
- They reproduce only inside the cells of the host organism, which may be a bacterium, plant or animal.
- Viruses can only be seen with an electron microscope.
- A virus is like a non- living thing outside the body of other organisms. Therefore, it is a borderline between a living and a non- living thing.

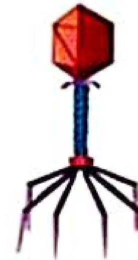












Types of Viruses

Where do Microorganisms Live?

Microbes can survive in all kinds of environments – from icy cold climates to hot springs (any kind of temperature); and deserts to marshy lands (any humidity level). Some live independently while others live as parasites – inside the bodies of other organisms (including animals and human beings).

Microorganisms and Us:

Some of Microorganisms are beneficial in many ways while some others are harmful and cause diseases.

Friendly Microorganisms:

Microorganisms are used for various purposes.

- Some microorganisms are used in the production of curd, bread and cake.
- Microorganisms have been used for the production of alcohol since ages.
- They are also used in cleaning up of the environment as composers. For example, the organic wastes (vegetable peels, remains of animals, faeces, etc.) are broken down into harmless and usable substances by bacteria.
- In agriculture fields, microorganisms are used to increase soil fertility by fixing nitrogen.

Commercial Use of Microorganisms:

- Microorganisms are used for large scale production of alcohol, wine and acetic acid (Vinegar).
- For commercial production of alcohol and wine, yeast is grown on natural sugars present in grains like barley, wheat, rice, crushed fruit juices, etc.

Medicinal Use of Microorganisms:

- Whenever we fall ill the doctor may give us some antibiotic tablets, capsules or injections like penicillin. The source of these medicines is microorganisms.
- These medicines produced from Bactria and fungi kill or stop the growth of the disease-causing microorganisms. Such medicines are calledantibiotics.
- Streptomycin, tetracycline and erythromycin are some of the commonly known antibiotics.
- The antibiotics are made by growing specific microorganisms and are used to cure a variety of diseases. Antibiotics should be taken only on the advice of a qualified doctor.
- Antibiotics are even added with the feed of livestock and poultry for checking microbial infection in animals.
- Microorganisms are also used to control many plant diseases.

Vaccine:

- When a disease-carrying microbe enters our body, the antibodies produced by our body fight with the invader. If microbes enter again, the body also remembers that how to fight with the microbes.
- If dead or weakened microbes are introduced in a healthy body, the body fights and kills them by producing suitable antibodies.
- The antibodies remain in the body for protecting from the disease-causing microbes. This is how a vaccine works.
- Several diseases like cholera, tuberculosis, smallpox and hepatitis can be prevented by vaccination.

Increasing Soil Fertility:

Some bacteria and blue green algae are able to increase the fertility of soil by fixing nitrogen from the atmosphere to enrich soil with nitrogen. These microbes are commonly called biological nitrogen fixers.

Cleaning the Environment:

Some microorganisms decompose the organic waste and dead plants and animals into simple substances and clean up the environment.

Harmful Microorganisms:

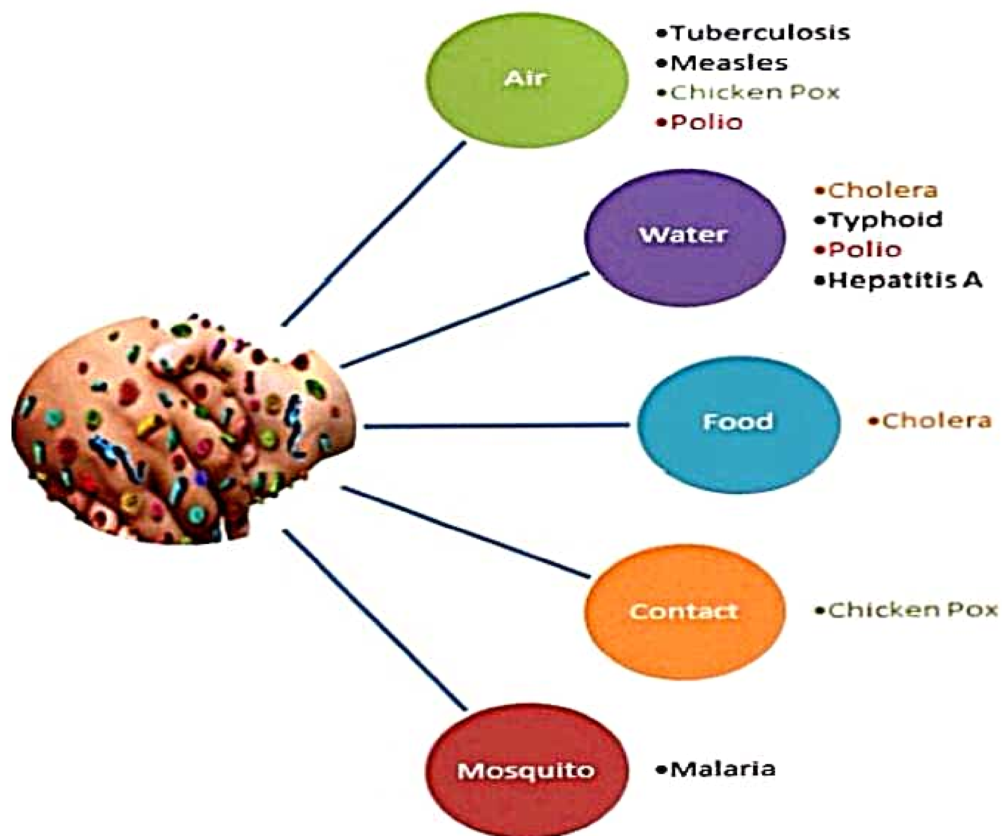
Microorganisms are harmful in many ways:

- In human beings, plants and animals, some of the microorganisms cause diseases. Such disease-causing microorganisms are calledpathogens.
- Food, clothing and leather are spoiled due to some harmful microorganisms.

Disease-causing Microorganisms in Humans:

- Pathogens enter our body through the different way like air when we breathe, the water when we drink or the food when we eat. They can also get transmitted by direct contact with an infected person or carried through an animal.
- Microbial diseases such as cholera, common cold, chicken pox and tuberculosis that can spread from an infected person to a healthy person through air, water, food or physical contact are called communicable diseases.
- There are some insects and animals which act as carriers of disease causing microbes.
  For example housefly is one such carrier that sits on the garbage and animal excreta. Pathogens stick to their bodies. When these flies sit on uncovered food, they transfer the pathogens. Whoever eats the contaminated food is likely to get sick. So, it is advisable to always keep the food covered. Some more examples of carrier microbes are the female Anopheles mosquito, which carries the parasite of malaria. Female Aedes mosquito acts as carrier of dengue virus.
- All mosquitoes breed in water. So, one should not let water collect anywhere like in coolers, tyres, flower pots etc. By keeping the surroundings clean and dry we can prevent mosquitoes from breeding.

Common Diseases and their Modes of Transmission



Types of diseases

There are two types of diseases:

- Communicable
- Non Communicable

Communicable Disease

Microbial diseases that can spread from an infected person to a healthy person through air, water, food or physical contact are called communicable diseases. Examples of such diseases include cholera, common cold, chicken pox and tuberculosis.

Non-Communicable Disease

The diseases that do not spread through sick to a healthy person are called non – communicable diseases. We can also say that the non-communicable diseases are those which cannot be transferred from one person to another person. For example: Lung Cancer or liver damage.

Preventing the spread of Communicable diseases:

Some simple methods of limiting the spread of communicable diseases are:

- ✓ To keep the infected person separated from others and to advice him/ her to keep a handkerchief on the nose and mouth while sneezing.
- ✓ To keep our environment or surrounding clean.
- ✓ Never let garbage collect in the neighbourhood.
- ✓ Timely vaccination against diseases.
- ✓ To prevent mosquitoes from breeding, we should not allow water to collect anywhere in our neighbourhood.

Diseases Caused by Microorganisms in Animals

Anthrax: A dangerous disease that affects human and cattle caused by a bacterium called ***Bacillus Anthracis.***

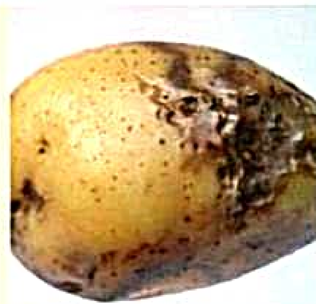
Foot and mouth disease in Cattle: It is caused by a virus called **Foot-and-mouth-disease Virus** (FMDV).

Diseases Caused by Microorganisms in Plants

Microorganisms can cause diseases in plants and reduce crop yield. Some of the plants in which they cause diseases are:


Wheat


Rice


Potato


Sugarcane


Orange


Apple

The plants can be protected by using chemicals that kill these microbes.

Common Diseases in Plants caused by Microbes

Citrus Canker is caused by <u>Bacteria</u> and spreads through **Air**.

Rust of Wheat is caused by <u>Fungi</u> and spreads through **Air or Seeds**.

Yellow Vein Mosaic of Okra (Bhindi) is caused by <u>Virus</u> and spreads through **Insects**.

Food Poisoning:

Food poisoning in humans could be due to the consumption of food spoilt by some microorganisms. Microorganisms that grow on our food sometimes produce toxic substances and make the food poisonous causing serious illness and even death. So, it is very important that we preserve food to prevent it from being spoilt by the microorganisms.

Food Preservation:

Microorganisms spoil our food. Spoiled food emits bad smell and has a bad taste and changed colour. Some common methods to preserve food are as follows:

a. **Chemical Method:**

- Preservatives like Salts and edible oils are the common chemicals generally used to check the growth of microorganisms.
- We add salt or acid preservatives to pickles to prevent the attack of microbes. Sodium benzoate and sodium metabisulphite are common preservatives which are used in the jams and squashes to check their spoilage.

b. **Preservation by Common Salt:**

- To preserve meat and fish for ages, common salt is used. Meat and fish are coveredwith dry salt to check the growth of bacteria.
- Salting is also used to preserve amla, raw mangoes, tamarind, etc.

c. **Preservation by Sugar:**

- Sugar is used for preserving jams, jellies and squashes.
- It reduces the moisture content which inhibits the growth of bacteria which spoil food.

d. **Preservation by Oil and Vinegar:**

- Oil and vinegar are used to prevent spoilage of pickles because bacteria cannot live in such an environment.
- Vegetables, fruits, fish and meat are often preserved by this method.

e. **Heat and Cold Treatments:**

- Boiling of milk kills many microorganisms, after that it can be stored or used.
- We keep our food in the refrigerator. Low temperature inhibits the growth of microbes.
- Pasteurized milk can be consumed without boiling as it is free from harmful microbes. The milk is heated to about 70 ^{0}C for 15 to 30 seconds and then suddenly chilled and stored. By doing so, it prevents the growth of microbes. This process was discovered by Louis Pasteur. It is calledpasteurisation.

f. **Storage and Packing:**

- Dry fruits and even vegetables are sold in sealed air tight packets to prevent the attack of microbes.

Nitrogen Fixation

Nitrogen constitutes 78% of our atmosphere. In living organisms, it is found in:

- Proteins,
- Nucleic Acids,
- Chlorophyll, and
- Vitamins.

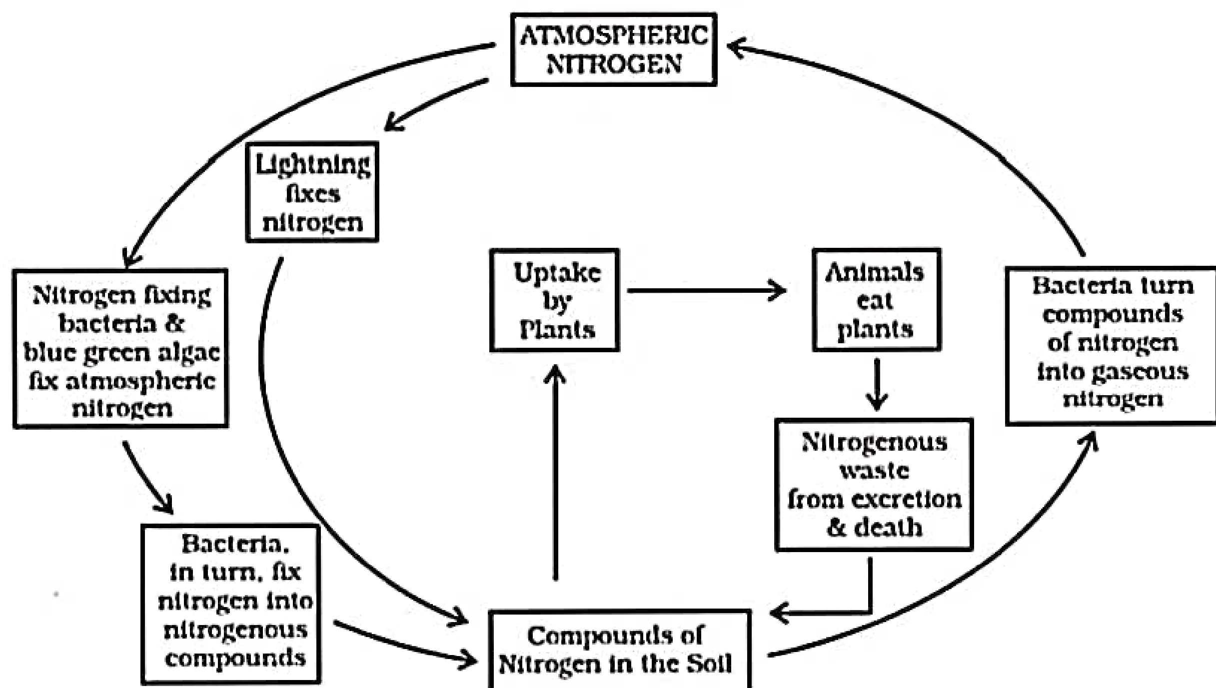
Atmospheric nitrogen cannot be used directly by the plants and animals. It gets fixed by either lightning or natural nitrogen fixers.

Nitrogen Cycle

Nitrogen Cycle is a biogeochemical process which transforms the inert nitrogen present in the atmosphere to a more usable form for living organisms."

It involves five steps :-

1. Nitrogen fixation
2. Nitrogen assimilation
3. Ammonification
4. Nitrification
5. Denitrification



- Bacteria and blue green algae present in the soil fix nitrogen from the atmosphere and then convert it into compounds of nitrogen.(Nitrogen fixation)
- After this, usable compounds can be utilised by plants from the soil through their root system. These compounds are then used for the synthesis of plant proteins and other compounds. Animals feeding on plants get these proteins and other nitrogen compounds.(Nitrogen assimilation)
- When plants and animals die, bacteria and fungi present in the soil convert their remains into ammonia (Ammonification).
- The process of conversion of ammonia into nitrates that are to be used by plants again is called Nitrification. Certain other bacteria convert some part of them to nitrogen gas which goes back into the atmosphere (Denitrification). As a result, the percentage of nitrogen in the atmosphere remains more or less constant.

QUESTION-ANSWERS

Q1. Fill in the blanks:

(a) Microorganisms can be seen with the help of a microscope.

(b) Blue green algae fix nitrogen directly from air to enhance fertility of soil.

(c) Alcohol is produced with the help of yeast.

(d) Cholera is caused by bacteria.

Q2. Tick the correct answer:

(a) Yeast is used in the production of

(ii) alcohol ✓

(b) The following is an antibiotic

(ii) streptomycin ✓

(c) Carrier of malaria-causing protozoan is

(i) female *Anopheles* mosquito ✓

(d) The most common carrier of communicable diseases is

(ii) housefly ✓

(e)The bread or idli dough rises because of

(iii) growth of yeast cells ✓

(f) The process of conversion of sugar into alcohol is called

(iii) fermentation ✓

Q3. Match the organisms in Column I with their action in Column II.

Column I	Column II
(i) Bacteria	(e) Causing cholera
(ii)*Rhizobium*	(a) Fixing nitrogen
(iii) *Lactobacillus*	(b) Setting of curd
(iv)Yeast	(c) Baking of bread
(v) A protozoan	(d) Causing malaria
(vi) A virus	(f) Causing AIDS

Q4. Can microorganisms be seen with the naked eye? If not, how can they be seen?

Micro-organisms are very small in size. They are so small that they cannot be seen with naked eyes. A microscope has to be used to see these organisms. Therefore, they are called micro-organisms.

Q5: What are the major groups of microorganisms?

There are five major groups of micro-organisms:

(i) **Bacteria** – They are single celled disease-causing micro-organisms. They can be spiral or rod-shaped.

(ii) **Fungi** – They are mostly multicellular disease-causing microbes. Bread moulds are common examples of fungi.

(iii)**Protozoa** – They mainly include organisms such as *Amoeba, Plasmodium*, etc. They can be unicellular or multicellular.

(iv)**Virus** –Viruses are disease-causing microbes that reproduce only inside the host organism.

(v) **Algae** – They include multicellular, photosynthetic organisms such as *Spirogyra,* Chlamydomonas, etc.

Q6: Name the microorganisms which can fix atmospheric nitrogen in the soil.

Bacteria such as *Rhizobium* and certain blue-green algae present in the soil can fix atmospheric nitrogen and convert it into usable nitrogenous compounds. These nitrogenous compounds can be easily utilized by plants for the synthesis of plant proteins and other compounds.

Q7: Write 10 lines on the usefulness of microorganisms in our lives.

Micro-organisms are very useful to us. They help us in following ways:-

- Micro-organisms help us in food sector. They are used for curdling of milk, preparation of bread, cake, etc.
- They are used to produce alcohol at large scale.
- They are also used to produce wine.
- Yeast is used in bakeries.
- They are also used as preservatives for food items.
- They are used to make different medicines, especially the antibiotics.
- Micro-organisms are used to prepare vaccines for various diseases.
- They are useful for agricultural sector, as they enhance the fertility of soil by fixing nitrogen.

- They work as natural cleaners, as they decompose the dead bodies of plants and animals.
- Micro-organisms prepare manures by decomposing dead bodies of plants and animals.

Q8: Write a short paragraph on the harms caused by microorganisms.

Harmful effects of micro-organisms: Micro-organisms cause diseases in animals. For example, in humans, bacteria cause diseases such as tuberculosis, cholera, typhoid, etc. In cattle, the foot and mouth disease is caused by a virus. Also, several microbes cause diseases in plants. For example, the productivity of wheat, orange, apple, etc. is reduced due to microbial diseases in plants. Certain microbes, on entering into our body, produce toxic substances. This leads to food poisoning. Some micro-organisms such as fungus spoil our food. For example, bread when left unused under moist conditions gets spoilt by fungus, producing a white cotton-like growth on the bread.

Q9: What are antibiotics? What precautions must be taken while taking antibiotics?

Antibiotics are medicines produced by certain micro-organisms to kill other disease-causing micro-organisms. These medicines are commonly obtained from bacteria and fungi. Streptomycin, tetracycline, penicillin, etc. are common antibiotics.

Precautions to be taken while using antibiotics:

a) Antibiotics should be taken under the supervision of a well qualified doctor.
b) Course (intake) of antibiotics should be completed as per the prescription given by the doctor.
c) Antibiotics should be taken in the right amount and at the right time. A wrong dose of antibiotics makes the drug ineffective. Also, excessive consumption of drugs may kill the useful bacteria present in our body.

Topic: CONSERVATION OF PLANTS AND ANIMALS

Conservation:- It is defined as the management of the human use of the biosphere so that it may yield the greatest benefits to the present generation while maintaining its potential to meet the needs for the future generation. It is the wise and judicious use of resources.

Aims of Conservation:-

i) To preserve the quality of environment i.e. maintain a pollution free environment.

ii) Ensuring the continuous yield of useful materials, living or non-living, by establishing a balanced cycle of harvest and renewal.

Biosphere:- It is that part of the earth in which living organisms exist or which supports life.

Wildlife:- It means all the animals and plants which are found naturally in the forests and other natural habitats.

Biodiversity:- It refers to the variety of organisms found in a particular area, it denotes the richness of species in a particular habitat.

Ecosystem:- It includes all the living organisms of an area and the physical environment in which they live. In an ecosystem various living organisms interact among themselves through food chains and also with the physical environment in which they live.

WildAnimals:- The animals living in the natural environment like forest are called wild animals. These are not domesticated by man.

Wildplants:- The plants growing in natural environment on their own are called wild plants. These are not cultivated by man.

Greenhouseeffect:-The trapping of heat rays by carbon dioxide resulting in warming up of the earth's atmosphere is called Green house effect.

Globalwarming: The gradual increase in the overall temperature of earth's atmosphere due to green house effect caused by the increased level of CO_2in the atmosphere is called global warming. . :

Desertification:-Gradual conversion of a fertile land into a desert is called desertification.

Flora:- The plants that grow naturally in a particular area are called flora of the area e.g. teak, fern mango are the flora of Pachmarhi Biosphere Reserve.

Fauna: The animals which live naturally in a particular area are called fauna of that area e.g. wolf, leopard, wild dog are the fauna of Pachmarhi Biosphere Reserve.

Fertile Offspring:- A fertile offspring is a baby animal or a baby plant which can reproduce its own kind of organisms in due course of time.

Species:- A species is a group of same kind of organisms which can interbreed to produce fertile offspring. All the members of a species have common features. Some of the examples of species are Human, cat mango, paddy etc. There are about six lakh species of animals and four lakh species of plants in the world today.

EndemicSpecies:-These are those species of plants and animals which are found exclusively in a particular area. These are restricted to a certain area and are not found naturally anywhere else in other areas. For example sal and wild mango are the endemic flora of the PachmarhiBioshere Reserve. Indian giant squirrel, flying squirrel and bison are the endemic fauna of the Pachmarhi Biosphere Reserve.

Factors endangering the existence of endemic species:-

i) Destruction of forests

ii) Introduction of new species.

iii. Increasing human population.

ExtinctSpecies:-

The species which no longer exist anywhere on the earth are called extinct species. These have died out completely. A species becomes extinct when the last living member of that species dies e.g. Dinosaur, Dodo, cave lion, Caspian tiger and Irish deer are all extinct and have vanished from the earth.

EndangeredSpecies:-The species which are facing the risk of extinction are calledendangered species. These are on the verge of vanishing from the earth. These exist in small number on the earth, and if we do not take quick action to save them, they may become extinct. The small animals are much more in danger of becoming extinct than the bigger animals. Some examples of endangered animal species are Tiger, Snow Leopard, Asiatic lion, Kashmir stag (Hangul), Desert cat etc.

Extinct in wild:- The species of which captive individuals survive but there is no free living natural population comes under this category e.g. Black Soft-Shell Turtle, Hawaiian Crow etc.

*Critically endangered:-*The species which faces a very high risk of extinction in the wild is known as critically endangered species e.g. Ivory Billed wood-pecker, Mountain Gorilia, the Little Dodo Bird etc.

Vulnerable Species:- These are the species which are likely to move to endangered category in near future if causative factors continue to operate e.g. Asian Black Bear, Indian Rhinoceros, African Elephant etc.

Rare Species:- These exist in small number and are localized in certain geographical area and may enter into vulnerable category e.g. red wolf, Golden Tabby Tiger, Wild Buffalo etc.

*Biodiversity Hot Spots:-*These are the earth's richest and most diverse areas in terms of their flora and fauna. India contains about 25-Hot spots and some of them are:-

i) Silent valley (Kerala)
ii) Himalayas (India/Nepal)
iii) Gir forest (Gujarat)

*Chipko Movement:-*The movement was born in a small hilly village of the upper reaches of Himalayas. The illiterate tribal women commenced this unique movement in December 1972 that became famous as the Chipko (means to embrace) movement. The movement commenced in the Tehri-Garhwal district of U.P. that actually gathered momentum in 1978 when the women faced police firing. It looked as if the movement aimed at saving trees on the Himalayan slopes from the axes of greedy contractors, but its objectives were broad-based. However, chipko reached to Karnataka as "Appiko".

Deforestation:-Itis the process of clearing of forests by cutting down forest trees over a wide area. Trees in the forest are cut for some of the below mentioned purposes:-

i) Procuring land for cultivation.
ii) Building houses and factories.
iii) Making furniture.
iv) Using wood as fuel.
v) Developing industries.

Causes of Deforestation

The main causes of deforestation can be grouped into following two types:

1) Man-made causes 2) Natural causes

Man-madecauses of deforestation include all such ways by which man cuts the trees on alarge scale so as to fulfill his various needs.

Natural causes involve the destruction of forests by natural processes like forest fires and severe droughts.

Effects/Consequences of deforestation:

Deforestation is the biggest threat to the existence and survival of living organisms in the following ways:-

1) It snatches away the natural habitat of many animals, plants and birds. It puts many species in endangered zone and many get extinct.
2) Increased temperature on earth would disturb the water cycle and may reduce rain fall causing droughts.
3) As Pollution level increases level of carbon-dioxide in the atmosphere would go up. This would lead to global warming.
4) In the absence of forest cover, the summer becomes hotter while winters become severely cool.
5) Removal of plant cover in the plains makes the area dry. The soil becomes loose leading to desertification.
6) Removal of plant cover exposes the fertile soil to wind and water leading to soil erosion. .Groundwater level would go down.
7) A number of useful products obtained from trees are also lost. The other properties of the soil like texture, nutrient content etc. also change.

Conservation of Forests and Wildlife (Biodiversity):

Forests and wildlife need to be conserved to preserve biodiversity, to prevent endangered species from becoming extinct and to maintain ecological balance in nature and this can be achieved in the following ways:

1) Deforestation should be avoided.
2) Afforestation should be undertaken.
3) Hunting of animals which is banned should be strictly enforced.
4) Illegal trade in animal skin and elephant tusks should be checked.
5) Alternate sources of energy should be encouraged.
6) Protected areas should be established.
7) Effective system to prevent and fight forest fires should be established.

8) Regular surveys to monitor the population of all the species in forests should be conducted.
9) Laws to conserve biodiversity should be enacted and strictly enforced.
10) Environmental awareness programmes should be conducted on a large scale.
11) NGOs should be provided encouragement to undertake conservation work.

Reasons for Conservation of Wildlife:

1. Ecological diversity
2. Aesthetic value of wildlife.
3. To maintain environmental quality.
4. To preserve genetic pool.
5. To earn money.
6. For breeding programmes.
7. Essential for forest ecosystem.
8. To maintain balance in nature.
9. To maintain greenery of nature.

Protected Areas

There are three types of protected areas which have been established by the Government for the conservation of forests and wild animals. These are:

1) Biosphere Reserves
2) Wildlife Sanctuaries
3) National Parks

1) *Biosphere reserve*:- It is a large protected area of land meant for the conservation of wildlife, biodiversity and the traditional lifestyle of the tribal people living in the area. A Biosphere Reserve is divided into three zones:

i) Core zone ii) Buffer zone iii) Transition zone

Core zone:- The innermost zone of Biosphere Reserve is known as core zone. No human activity is allowed in this zone and it is meant for strict protection of wildlife.

Buffer zone:- The middle zone of a Biosphere Reserve is called buffer zone. It surrounds the core zone. In this zone only limited human activity is allowed e.g. research, environmental education and tourism.

Transition zone:- The outermost zone of a Biosphere Reserve is called transition zone. In this zone several non-destructive human activities are allowed such as houses of tribals, cultivation of crops.

A Biosphere Reserve may also contain other protected areas in it e.g. Wildlife sanctuaries or National Park. No commercial exploitation of natural resources is allowed in a Biosphere Reserve.

Different Biosphere Reserves in India:-

There are fourteen Biosphere Reserves in India and some of them are:-

1)Great Nicobar Biosphere Reserve (Andaman and Nicobar)

2)Kaziranga Biosphere Reserve (Assam)

3)Sunderbans Biosphere Reserve (West Bengal)

4)Kanha Biosphere Reserve (Madhya Pradesh)

5)Pachmarhi Biosphere Reserve (Madhya Pradesh)

Pachmarhi Biosphere Reserve contains other protected areas in it. It contains two Wildlife sanctuaries and one National Park. The two Wildlife Sanctuaries are Bori Sanctuary and Pachmarhi Sanctuary and the National park is Satpura National Park.

Functions Of Biosphere Reserve:

1. It helps in the conservation of wildlife of the area.
2. It helps to maintain the bio-diversity of the area.
3. It preserves the ecosystems in the area.
4. It promotes the economic development of the area which is compatible with conservation objectives.
5. It helps to maintain the lifestyle and culture of the tribal people living in the area. It prevents the commercial exploitation of the area.
6. It provides opportunities for scientific research, environmental education and tourism.

Wildlife Sanctuary :-It is a protected area of land which is created for the protection of wild animals in their natural environment. It provides protection and suitable living conditions to the wild animals in their natural habitat. Killing and capturing of wild animals is strictly prohibited. India has more than 500 wildlife sanctuaries. The names of some of these are:-

1. Sanjay Gandhi Wildlife Sanctuary (Maharashtra).
2. Mudumalai Wildlife Sanctuary (Tamil Nadu)

3. Bharatpur Bird Sancturay (Rajasthan)
4. Dandeli Wildlife Sanctuary (Karnataka)
5. Overa Wildlife Sanctuary (J&K)

Zoo: It is the short form of Zoological garden or 'Zoological Park'. A large garden or park where many types of wild animals and birds brought from different parts of the country and the world are kept in cages or enclosures, so that people can see them, is called a zoo.

National Park:-Itis a relatively large area of scenic beauty protected and maintained by the government to preserve flora and fauna, landscape, historic objects of the area and places of scientific interest. It also provides human recreation and enjoyment. It is large and diverse enough to protect whole sets of ecosystems. The exploitation of natural resources is strictly prohibited.

India has more than 80 National parks. Many of these were initially wildlife Sanctuaries. Some if the prominent National parks of India are:-

- Corbett National Park (Uttarakhand)
- Kanha National Park (Madhya Pradesh)
- Gir National Park (Gujarat)
- Kaziranga National Park (Assam)
- Dachigam National Park (Jammu and Kashmir)

***Project Tiger*:-** It is a wildlife conservation project which was launched by the Government of India on 1st April 1973 to protect the tigers in the country. The objective of this project was to ensure the survival and maintenance of the tiger population in specially constituted Tiger Reserves throughout India. There are 28 Tiger Reserves in India at present which are governed by Project Tiger. One such Tiger Reserve is the Satpur Tiger Reserve of Satpura National park, following are its various objectives:-

1. To maintain a viable population of tigers for scientific, cultural and ecological values.
2. To preserve areas rich in biodiversity as a national heritage for the education and enjoyment.
3. To promote elimination of all forms of human exploitation and disturbance from the core zones.

Differentiate between:

Biosphere Reserve	**Wildlife Sanctuary**
It is spread over a very large area of land.	It occupies a comparatively smaller area of land.
Local people form an integral part of it.	Local people do not form an integral part of it.
Human activities are allowed in its outermost zone.	Human activities are not allowed.

Wildlife Sanctuary	**Zoo**
Here wild animals and birds live in their natural habitat in the forest.	In a zoo, wild animals live in settings such as cages and enclosures.
It is not open to public freely.	It is open to public for a fixed time every day.
Wild animals and birds are very comfortable in this natural environment.	Wild animals and birds are not comfortable in this artificial-environment.

Wildlife Sanctuary	National park
It protects and preserves the wild animals in their natural environment.	It protects and preserves wild animals and in their natural environment as well as the scenic beauty, historical objects and habitats of scientific interest in the area.
It is dedicated to the protection of wild animals only.	In addition to protection, wild animals are kept for recreation, enjoyment and educative interests.
It usually does not allow easy access to the visitors.	It allows easy access for the visitors to the land and wildlife inside.

Recycling of Paper

Paper is made from wood pulp that is produced from the wood of forest trees. Paper making is as such a cause of deforestation as many trees have to be cut down from the forests to make paper. We should save paper to save the forest trees. The term recycling of paper means to process waste paper so that it can be used again. Paper can be recycled five to seven times for use. We should 'save paper', 'reuse paper' and 'recycle paper' and it can help us:

1. To save forest trees from being cut down
2. To save water used in paper making.
3. To save energy (electricity) used in making paper.
4. To reduce the amount of harmful chemicals used in paper making.

Red Data Book:-It is a publication which keeps record of all the endangered animal, plants and other species. It contains a list of species which are in danger of becoming extinct. There are different Red Data Books for plants, animals and other species The advantage of maintaining Data Book is that we come to know which species of animals and plants are very small in number and facing the danger of extinction so that timely remedial steps can be taken by the

Authorities concerned to prevent their extinction. It is maintained by IUCN (International Union for the Conservation of Nature and Natural Resources) widely known as World Conservation Union (WCU). The first Red Data Book Was compiled in 1991 and it is revised periodically.

Migration:-The moving of a bird or other animal from one place to another according to the season is called migration. It is the movement from one place to another in one season and return in different season. It can be regarded as an adaptation to escape the harsh and cold conditions ofnormal habitat in winter so as to survive. The birds which cover long distances to reach to other land are known as the migratory birds. The purpose of migration is:-

1. To escape bad weather conditions.
2. To find plenty of food and shelter.
3. To lay eggs (breeding).

India is one of the destinations of many of the migratory birds coming from the very cold regions of the earth. E.g. Siberian Crane which comes from Siberia and visits many areas in India such as Bharatpur in Rajasthan, Sultanpur in Haryana, some wet lands of North east. It stays here for a few months and then flies back to Siberia when the climate becomesfavourable.

Reforestation:-

The term 'reforestation' means to cover again with forest by planting new trees. It can be defined as a process of planting of trees in an area in which forests were destroyed. Forests are called green wealth of a country. If we have to retain our 'green wealth' for future generations, then planting of more trees (reforestation) is the only option. Reforestation can also take place naturally. If the deforested area is left undisturbed for some time, it re-establishes itself by the natural growth of trees. This is called natural reforestation. There is no role of human beings in natural reforestation.

Advantages of Reforestation

1. It produces a large quantity of raw materials for industry, timber trade etc.
2. It will lead to a decrease in global warming by reducing the amount of carbon dioxide gas in the atmosphere.

3. It increases rainfall in an area thereby raising ground water level and preventing droughts.
4. It prevents soil erosion and floods.
5. It increases the area of earth under forests which is good for the conservation of wildlife.

Forest Conservation Act

It is aimed at the preservation and conservation of natural forests and meeting the basic needs of the people living in or near the forests.This act was launched by the Government of India and forest department for the following purposes:-

1. To conserve forests as a natural heritage.
2. To control the movement of the forest products.
3. To control and regulate cattle grazing in the forests.
4. To create and manage reserved, protected and village forests.

Note: Satpura National Park is the first Reserve Forest of India.

Textbook exercises

1) Fill in the blanks

Do it yourself

2) Differentiate between the following:

a) Wildlife Sanctuary and Biosphere reserve: Refer to above Notes

b) Zoo and Wildlife Sanctuary: Refer to above Notes

*c) Endangered Species:*The species whose number is diminishing to a level that they might face extinction in near future are called endangered species.

Extinct Species: The species whose numbers are nil (zero), because of changes in their habitat and other calamities.

d) *Flora*: The plants that are found in a particular area are called flora for example, sal, teak, jamun etc.

e) Fauna: The animals that are found in a particular area are called fauna. For example chinkara, cheetal, leopard etc.

Q3) Discuss the effects of deforestation on the following:

a) *WildAnimals*: Deforestation leads to the change in the natural climate or habitat of the animals, so the species may become endangered and ultimately extinct in the near future.

b) *Environment*: Deforestation increases the temperature and pollution level on the earth. It decreases the level of oxygen in the atmosphere and ground water level is

also lowered. The fertility of the soil will decrease and therefore the chances of natural calamities increase.

c) *Village (Rural areas)*: Decline in rainfall causes decrease in soil fertility which can lead to lower agricultural production of crops in villages. The natural calamities like flood are also the effects of deforestation which adversely affect the villages.

d) *Cities (Urban areas)*: Deforestation leads to global warming as carbon dioxide traps the heat of sun rays.With continuous global warming many glaciers may melt leading to drowning of many coastal cities.

e) *Earth*: Deforestation leads to soil erosion, change in the physical properties of the soil, removal of humus layer by which the hard and rocky layer exposes. All these ultimately convert the fertile land into desert.

f) *The Next Generation:*Deforestation shows the ugliest face to the survival of next generation with problems at every step in their survival. Next generations may have to face unusual weather changes. Health of future generations may be badly hit due higher pollution levels caused by deforestation. Deforestation may also lead to food scarcity for future generation.

Q4) What will happen if

a)If we go on cutting trees, then:

1. Survival of the mankind will face a threat, because of low oxygen concentration.
2. We will have to face high temperature and pollution level.
3. Natural calamities will occur.
4. The water cycle will be disturbed.

b)The habitat of an animal is disturbed.

1. The animals will lose their natural habitat and ultimately will come at the periphery to become endangered
2. The survival of animal will be difficult, because of the drought and the rise in temperature.

c)The top layer of soil is exposed

i) The exposed top layer looses all its nutrients.

ii) Decrease in the water holding capacity of the soil.

iii) Vegetation will go off from the field and desertification will be the result.

Q5) Answer in brief:

1. *Why should we conserve biodiversity?*
   a. Biodiversity refers to the variety of life existing on earth, their inter relationships and their relationship with the environment. If we do not conserve biodiversity ,the food chain will get disturbed and the whole ecosystem will be affected.
2. *Protected forests are also not completely safe for wild animals. Why?*
   a. Protected forests are also not completely safe for the wild animals because poaching or capturing of the animals is easy for the people living in the neighbourhood.
3. *Some tribals depend on the jungle. How?*
   a. Tribals are dependent on jungles for the fulfillment of their daily needs of life. They feed themselves from the different types of vegetation found in jungles and by hunting the wild animals of the jungle.
4. *What are the causes and consequences of deforestation?*
   Refer to Notes.
5. *What is Red Data Book?*
   Refer to Notes
6. *What do you understand by the term migration?*
   Refer to Notes
7. *In order to meet the ever-increasing demand in factories and for shelter, trees are being continually cut. Is it justified to cut tree for such projects? Discuss and prepare a brief report.*
   a. It is not at all justified to cut trees for just to fulfill our demand, because cutting of trees has more disastrous effect than the benefit we will get from cutting those. (students should elaborate and prepare a brief report as asked in the question based on their understanding of the above notes)
8. *How can you contribute to the maintenance of green wealth of your locality? Make a list of actions to be taken by you.*
   a. To maintain the green wealth in my locality, the different actions that can be takentaken are:
      i. Not to allow anybody to cut any trees

ii. Always try to plant saplings in my area

iii. Never neglect the watering of plants

iv. Always trimming the plants time to time for their better growth.

9. *Explain how deforestation leads to reduced rainfall.*
   a. Deforestation leads to reduced rainfall because when the plants/trees transpire, then only the ground water turns into water vapour and goes upward and makes the clouds which are the basic reason for rainfall

10. *Find out the information about national parks in your state. Identify and show their location on the outline map of India.*
    a. Dachigam National Park and Kishtawar High Altitude National Park.

11. *Why should paper be saved? Prepare a list of ways by which you can save paper?*
    a. Paper should be saved for the following reasons:

a) A large number of trees can be saved by saving paper this can check deforestation.

b) Saving paper also saves energy and water needed for manufacturing paper.

c) Amount of harmful chemicals used in paper making will be reduced by saving paper. The ways to save paper are:

1) Economical use of paper.
2) Recycling of paper should be done.
3) Paper should not be burnt.

12. *Complete the word puzzle*:

Do it yourself

Class: 8th **Subject: Biology**

Topic: The Cell

Textual Questions:

Q1) Define a cell.

A)Cell is the structural and functional unit of life.

Q2) Whodiscovered the cell?

a) Cell was discovered by an English scientist "Robert Hooke" in 1665 while observing thin slices of cork under his self made crude microscope.

Q3) Give three examples of unicellular organisms?

a) The three examples of unicellular organisms are:- Amoeba, Paramecium, Chlamydomonas.

Answer the following questions:-

i) *Why cells could not be observed before 17th century?*

a) Cells are too small to be visible to the naked eye. There was no concept of microscope before 17thcentury, so the cells could not beobserved.

ii) *Why cork could not be observed as such by Hooke?*

a) Cork could not be observed as such by Hooke as it is a solid structure.

iii) *Where did Hooke demonstrate his observations on cork slice?*

a) Hooke demonstratedhisobservations on cork slice at the Royal Society of London.

iv) *Name the layer which is present outside the plasma membrane in plant cell.*

a) Cell wall is the layer which is present outside the plasma membrane in plant cell.

v) *Name the outermost layer of the animal cell.*

a) Cell membrane or plasma membrane is the outermost layer of an animal cell.

vi) *Name the cell part that has holes.*

a) Nuclear membrane is the cell part that has holes.

vii) *Where are chromosomes present in a cell?*

a) Chromosomes are present in the nucleoplasm of nucleus.

viii) *Name the cell organelles which are found in plant cell.*

a) The cell organelles which are found in plant cell are:

Cell Wall	Chloroplasts	Golgi complex
Plasma membrane	Vacuoles	Lysosomes
Nucleus	Endoplasmic reticulum	Ribosomes.
Mitochondria		

ix) *Name thecells having branched structure.*

Ans. Nerve cells are the cells which have branched structure.

x) *Which cell can be observed with unaided-eye?*

Ans) Ostrich egg is the cell which can be observedwith the unaided eye.

Q5)Mentionthefunctionsofthefollowing:-

a) *Cell membrane*:-It is also called as plasma membrane and is the outermost layer in animal cells. It is a living structure and is semi permeable in nature.

Functions:

1) It encloses a living substance called as cytoplasm.
2) It controls the movement of substances in andout of the cell through tiny holes.
3) It provides protection to internal cell organelles.
4) It provides shape and rigidity to the cells.

b) *Chromosomes*are thick thread like structures which contain genes.

Functions

1) Chromosomes contain genes that help in the inheritance (transfer) of characters from parents to offspring.

Q6) Why are following important to a plant cell?

Cell wall:- It is the outermost covering found in plant cells only. It is made up of stiff, non-livingmaterial called cellulose. It is absent in animal cells.

Functions:-

a) It surrounds the cell membrane of the cell.
b) It gives shape to the cell.
c) It provides protection to the cell.
d) It gives rigidity to the cell.

Chloroplast:- It is present only in plant cells.Chloroplasts are green coloured plastids containing green coloured pigment "chlorophyll".

Functions:-

a) It helps green plants to prepare food by the process of photosynthesis.

Mitochondria:-It is tiny rod shaped or thread like organelle having an outer and inner membrane.

Functions:

1) It performs the function of respiration.
2) It provides energy to the cell.

Nucleus:- The nucleus is the most important part of an eukaryotic cell. It has following components:

Nuclear envelope and nuclear membrane.

Nuclear sap or nucleoplasm

Nucleus and

Chromatin.

Functions:

1) It plays an important role in cell division.

2) Itcontrols and co-ordinates all activities of the cell.
3) It contains the genes that determine heredity.

Q7) Draw an outline diagram of an animal cell. Label the different parts.

Q8) Mention three differences between plant cell and animal cell.

Ans. The three differences between plant cell and animal cell are:

Plant cell	*Animal cell*
Cell wall is present.	Cell wall is absent.
Plastids are present.	Plastids are absent.
Only one large vacuole is present.	Vacuoles are more in number but small size
Lysosomes are either absent or very few in number.	Lysosomes are present and large in number

Q9) What features are possessed by both plant cells and animal cells?

The features that are shared or possessed by both plant cells and animal cells are:

Plasma membrane, mitochondria, endoplasmic reticulum, golgi complex, lysosomes and ribosomes.

Q10) Why are nerve cells long? Why do these cells have projections?

Nerve cells are long because it has to take impulses away from cell body. Nerve cells have projections in order to receive impulse.

Q11) Why are mitochondria known as power house of the cell?

Mitochondria are known as power house of the cell because it produces energy necessary for cellular functions.

Q12) Which four basic elements constitute more than 90% of protoplasm?

The four basic elements which constitute more than 90% of protoplasm are:

1) Carbon (C) 2) Hydrogen (H)
3) Oxygen (O) 4) Nitrogen (N)

Q13) Write in brief about the variation in shape and size of cells.

Variation in cell shape:- The basic shape of eukaryotic cell is spherical but the shape of cell is determined by the function of the cell. Thus, the shape of cell may be variable or fixed. Variable or irregular shape occurs in amoeba and white blood cells. Fixed shape of cell occurs in most plants and animals. Thus, cells may have diverse shapes such as polyhedral with (8 ,12 or 14 sides), spherical (eggs of many animals), spindle shaped (smooth muscle fibres),elongated (nerve cells), branched (pigment cells of skin), discoidal (red blood cells) and so on.

Variation in cell size:- The size .of different cells ranges between broad limits. Some plant and animal ceils are visible to the naked eye. Most cells, however, are visible only with a microscope, since they are only a few micrometers in diameter. The size of cells varies from very small cells of bacteria (0.2 5.0 μm)to the very large eggs of the Ostrich (1 70 x 135mm). Some nerve cells of human beings have a metre long tail. A single marine alga, acetabularia, measures nearly 10cm in height. The fibre cells of Manila hemp are over 100cm in length. Living red blood cells measures about 9 μm. Most other cells are between 20- 30μ in diameter. Smallest known cell is of bacterium. Mycoplasma that measures about 0.1μm.

Q14) Name the different cell organelles and the functions of these organelles.

The different cell organelles and their functions are given below:-

Organelle	Function
Mitochondria	It is the centre of cellular respiration and centre of production of energy in the form of ATP (Adenosine tri phosphate) molecules. Hence, it is called as power house of cell.
Vacuoles	It stores food as food vacuole and water as water droplets.

Plastids	It helps in the manufacture of food by photosynthesis. It acts as a centre for storage of food materials in cytoplasm. It gives colour to fruits and flowers.
Endoplasmic reticulum	It is a site of protein synthesis. It provides mechanical support to the cytoplasm. It helps to transport substances in the cytoplasm.
Golgi bodies	It helps in the secretion and synthesis of many substances. It is involved in transportation of certain materials out of the cell.
Lysosomes	It helps in the intracellular digestion, destroys old organelles and defend cells against pathogens. So, it is called as cellular housekeeper.
Ribosomes	It helps in the synthesis of proteins. Hence, are called as protein factories of the cell.
Chromosomes	It helps in the transfer of characters from parents to off-springs.

Q15)What is meant by protoplasm? How does it differ from cytoplasm?

Protoplasm has been derived from Latin word proto meaning first and plasma meaning liquid. Protoplasm is liquid material of cell. Cytoplasm along with nucleus and plasma membrane is known as protoplasm. It is made up of carbon, hydrogen, nitrogen and oxygen. Other elements such as sulphur, phosphorous and calcium are also present. These elements in special combination provide living nature to protoplasm.

:

However, cytoplasm is jelly like substance occupying most of space inside the cell. It occupies the space between the cell membrane and nucleus. It contains very important tiny structures called as organelles which perform various life functions.

Additional Questions

1) Write a note on discovery of cell.

Cell was discovered by an English scientist, Robert Hooke in 1665. He observed thin slices of cork under his crude microscope. He found that the cork was made of box like compartments, forming honey comb like structures. He named these compartments as cells.

2) What are the basic facts, of cell structure and function?

The basic facts of cell structure and function are:

i) Cells are the basic structural and functional units of life.

ii) These are the building blocks of living organisms.

iii) All cells contain cell organelles.

iv) Functioning of cells is responsible for the functioning of organisms.

3) List the differences between prokaryotic cell and eukaryotic cell.

The differences between prokaryotic cells and eukaryotic cells are:-

Prokaryotic cells	*Eukaryotic cells*
Size of cell is generally small (1-10 μn).	Size of cell is generally large (5 - 100 μm).
They are primitive and incomplete cells.	They are advanced and complete cells.
Nuclear material is not bound by nuclear membrane.	Nuclear material is bound by nuclear membrane.
Membrane bound organelles are absent.	Membrane bound organelles are present.
It contains single chromosome.	It contains more than one chromosome.
Examples are bacteria and cyanobacteria.	Examples are plants and animals.

4. Distinguish between plasma membrane and cell wall.

Plasma membrane	Cell Wall
It is living.	It is non living.
It is made up of phospholipids, proteins and polysaccharides.	It is made up of fibrous polysaccharide called as cellulose.
It is semi permeable.	It is permeable.
It is delicate.	It is rigid.
It is found in both plant and animal cells.	It is found in plant cell only

5. *Define cell as a basic unit of life.*

A cell is called basic unit of life because it performs all life functions like intake of food materials, excretion, metabolism, respiration, etc. For this a cell usually possesses a number of components or cytoplasmic structures called cell organelles. Each cell organelle performs a different function like clearing waste material, making new materials, protein synthesis, lipid synthesis, RNA synthesis, etc. This results in division of labour inside a cell. A cell is able to live and undertake various life functions because of its cell organelles. Since life functions are the same in all types of cells, the various cells possess same cell organelles despite belonging to different organisms and performing different functions.

6. *Draw an outline diagram of a plant cell. Label its different parts.*

Draw it yourself

Topic:Reaching the age of Adolescence

Puberty:-The age at which the sex hormones and gametes begin to be produced and boys and girlsbecome sexually mature. Generally boys attain puberty at the ageof 14 to15 years while girls reachpuberty at a comparatively lower age of 11-12 years.

Changes at puberty

The following changes start taking place in the body of boys and girls

Increase in height:-There is a sudden increase in the height of both boys and girls during puberty.This occurs due to the increase in the length of arms and legs. The rate of growth in height variesfrom person to person. Some may grow rapidly at the start of puberty and then slow down whereasothers may grow gradually.The height of an individual depends on the genes which are inherited from parents. During growthperiod one should take nutritive food for the proper growth of muscles, bones and other parts of thebody.

Change in body shape:-The change occurring in adolescent boys and girls is different. In girls pubic region widens and limbs become broader. Deposition of fat takes place around the hips, face and shoulders. In boys, shoulders become broader and the body muscles grow more than that ofgirls.

Change in voice:- At puberty, the voice box begins to grow. The larynx in boys is larger than that ingirls. The voice box can be seen as the Adam's apple in their throat. In girls, it is hardly visiblebecause of their small size.In boys, voice becomes deep and harsh whereas girls have high pitched voice.

Increased activity of sweat and sebaceous glands:-The secretion of sweat glands and sebaceous glands (oil glands) increases during puberty. This causes acne and pimples on the face of boys and girls at this time.

Development of sex organs:-The reproductive organs in boys and girls become fully functional at puberty.

In boys, the male sex organs like testes and penis develop completely. The testes start producingsperms.

In girls, the ovary enlarges and eggs begin to mature. Ovaries start releasing matured eggs.Onlyone egg is released per month.

Production of hormones:-At puberty testes and ovaries start producing sex hormones, Testes produce the male sex hormone called testosterone and the ovaries produce the female sex hormone called estrogen. The sex hormones play an important role in the process of reproduction and in the development of secondary sexual characters.

Reaching mental, intellectual and emotional maturity:-Adolescence is a period of change in a person's way of thinking. They become more independent and self conscious, intellectual development takes place and they spend considerable time on thinking, planning, analyzing, evaluating, exchanging views and ideas with others. They need the company of friends and get attracted towards opposite sex.

During Adolescence stage, young people undergo a period of emotional changes. They may feel depressed and have mood swings and low confidence. They may experience various moods such as

being happy, sad. anger, excited or irritated. They think they need a greater degree of freedom, independence and privacy. These are the major causes of mental stress and they start feeling insecure.

Secondary Sexual Characters in Humans:

There are two types of sexual characters in humans:

1) Primary sexual characters 2) Secondary sexual characters

Primary sexual characters are those characters which are present at birth. These include internaland external sex organs which are present in babies at the time of their birth. The primary sexual characters in males are testes, penis etc and the primary sexual characters in females are ovaries, oviducts, uterus, vagina. The primary sexual characters are directly involved in reproduction. Secondary sexual characters are enrolled by hormones and distinguish between sexually matured males and females, but are not directly involved in reproduction. In secondary sexual characteristics the body parts develop special features which make it easier to distinguish boy from a girl.e.g. growth of facial hair in boys and development of breasts in girls are the secondary sexual characterswhich help to distinguish a girl from a boy.

The secondary sexual characters start developing at the time of puberty and continue to developthrough the period of adolescence.

The main secondary sexual characters in males are as follows:

1. Facial hairs such as beards and mustaches develop.
2. Hairdevelop under the armpits, on chest and in the pubic region.
3. Voice becomes deeper
4. Muscles develop and shoulders become broader.
5. Increase in weight.
6. Adam's Apple develops in front of throat.The secondary sexual characteristics in boys/ males are produced by the male sex hormonecalled testosterone.

The main secondary sexual characters in females are as follows:-

1. Development and enlargement of breasts.
2. Hairs develop under arm pits, and in the pubic region.
3. Hips become broader and become more curved and prominent.
4. Pubic region widens.
5. Initiation of menstrual cycle.
6. Deposition of fat on face, shoulders and around hips.
7. High pitched voice/shrill voice.

The secondary sexual characters in girls are produced by a female sex hormone called estrogen.

<u>*Endocrine System*</u>

1. Hormones:-These are the chemical substances which co-ordinate the activities of living organismsand also controls their growth, development and behaviour. Hormones are made and secreted by specialized tissues in the body called as endocrine glands. They are poured directly into the

bloodthroughout the body by the circulatory system. The hormones produced by the endocrine glands may act at a particular sight or target sight which contains receptors on it. The hormones involved in the development and control of reproductive organs and secondary sexual characteristics arecalled as sex hormones. The common sex hormones are testosterone, estrogen and progesterone.

Glands

A gland is a structure which secretes a specific substance in the body. It is made up of group of cells or tissues.

Types of glands

There are three types of glands mainly:-

Exocrine glands: 2. Endocrine glands 3. Heterocrine glands

Exocrine gland:-A gland which secretes its secretions through a duct or a tube is called exocrine gland e.g. salivary glands, sebaceous glands and sweat glands. These are also called as duct glands.

Endocrine glands:-These are the glands which pour their secretions directly into the blood and do not have ducts are called endocrine glands or ductless glands. They make and secrete some chemical substances e.g. Thyroid glands, Adrenal gland etc.

Heterocrine gland:-A gland which has both endocrine as well as exocrine part in it is called a heterocrine gland e.g. Pancreas.

The Exocrine part of pancreas produce pancreatic juice and the endocrine part secretes insulin and glycogen.

Important Endocrine glands:

Pituitary gland:-It is located just below the brain. It is called the master gland because many of the hormones which it secretes control the functioning of other endocrine glands in the body. E.g. Pituitary gland secrete hormones that make other endocrine glands such as Thyroid gland, Adrenal gland etc to secrete their hormones. It is divided into three lobes.

1) Anterior lobe 2) Intermediate lobe 3) Posterior lobe

Anterior lobe secretes six hormones. Intermediate lobe secretes I hormones and Posterior lobe secretes two hormones. It secretes a number of hormones. Growth hormone is one of them which secreted by the Anterior lobe of pituitary gland. The function of growth hormone is to control the development of bones and muscles.

Disorders

Dwarfism:-It is the disorder which is caused due to less secretions of growth hormones. In this, aperson remains short.

Gigantism:-It is the disorder which is caused due to more secretion of growth hormones, in this, a person remains very tall.

ThyroidGland:It is located in the throat region. It is largest endocrine gland. It secretes three hormones, T_3, T_4, thyroxine. The function of thyroxine hormone is to control the role of metabolism, growth and respiration.

The deficiency of thyroxine hormones in children slows down growth and mental development andthis is known as cretinism. Its deficiency in adults cause a disease called goitre. Too much of thyroxinehormones increases the rate of growth, metabolism and respiration, thereby makes the person to lose weight.

Over secretion of this hormone is called hyper secretion and its less secretion is called hypo secretion which respectively causes hyper-thyriodism and hypo-thyriodism.

Pancreas:-Pancreas are just located below the stomach in the body. It is heterocrine gland. Its endocrine part secretes 2 hormones, insulin and glucagon. The function of insulin is to control the sugar metabolism in the body. .

Deficiency of insulin in the body causes a disease known as diabetes milletus.

The endocrine part of pancreas secretes pancreatic juice which is used in the process of digestion.

Adrenal gland:These are two in no. and are located on the top of two kidneys. Adrenal gland secretes adrenalinhormone. This hormone is produced under stress. It regulates heart beat, breathing rate, blood pressure,carbohydrate metabolism and universal balance. The adrenaline hormones prepares our body to function at maximum efficiency during emergency situations like danger, fear shock, surprise, anger orexcitement. So, adrenalin hormone is also called as emergency hormone. Adrenal gland also producesand secretes another hormone called aldosterone. This hormone maintains the correct salt balance in the body.

Testes and Ovaries.

Testes produce testosterone and the function of testosterone is to promote sperm production and development of secondary sex characters.

Ovaries produce estrogen and its function is to promote egg formation and development of secondary sex characters.

Reproductive phase of life in humans:

Adolescents become capable of reproduction at puberty when their testes and ovaries begin to produce gametes. Adolescent boys grow and become men and adolescent girls grow and become women. Inmen, the capacity to produce sperms usually lasts throughout the life but in women the capacity toproduce ovum lasts only upto 45-50 yrs of age.In females, the reproductive phase of life begins at puberty and generally continues till they reach the age of approximately 45-50 years.

With the onset of puberty, the ovum or egg begins to mature. One matured egg is released by one of the ovaries of women once in about 20-30 days. During this period, the inner lining of uterus grows and becomes thick and spongy and prepares itself to receive the fertilized egg. So incase fertilization occursthe fertilized egg cell begins to divide to form an embryo. The Embryo then gets embedded in the thickuterus living. This results in pregnancy which ultimately leads to the birth of a child. If the

ovum doesn't get fertilized then the thick and soft inner-lining of uterus along with the blood and unfertilized ovum are discharged out of the vagina. This flow of blood and other materials is termed as menstruation which continues for 3-5 days. Women of reproductive age undergo this periodical release of eggs from the ovary every month. The first menstrual from begins at puberty and is called menarche. This cycle of menstruation is repeated in a woman after every 28-30 days till an ovum gets fertilized.Menstruation stops when an ovum gets fertilized and women become pregnant.

The age at which menstruation stops and a women loses her ability to bear children is called menopause. It occurs in women around the age of 45-50 years. The whole menstrual cycle is controlled byestrogen hormone.

*Sex chromosome:*Chromosomes are present inside the nucleus of every cell of human body. All the human beings have 23pairs of chromosomes in the nuclei of their normal body cells. Out of these 22 pairs of chromosomes arecalled autosomes while the remaining 1 pair of chromosome is called sex-chromosomes. The twosex chromosomes are named xchromosome and y chromosome. A female has only x chromosome in all hergametes i.e. ova. And male has x chromosome as well as y chromosome in male gametes called sperms. Actually half the sperms have x chromosome and the other half of sperms have y chromosomes. Thegametes are not normal body cells but they are special cells called reproductive cells and each gamete contains only 23 single chromosomes.

Determination of the sex of a baby

The sex of a baby is determined by the type of sex-chromosomes present in the fertilized eggor zygotefrom which the baby develops. This will become clearer from the following discussion.

If a sperm carrying x chromosome fertilizes an egg which carries x chromosome then the zygote formed will have xx combination of sex chromosomes due to which the child born will be a girl.

If a sperm carrying y chromosomes fertilizes an egg which carries x chromosome then the zygoteformed will have xy combination of sex chromosomes due to which the child born will be a boy/male.

Thusthe sex of unborn child depends on whether the zygote formed at the time of fertilization has xx combination or xy combination of sex chromosomes. Traditionally it is believed that a mother is responsible for the sex of a child but as we can see from the above discussion it is the sex chromosomein the sperm that determines the sex of a baby. Therefore, it is the father who is responsible for a male or female child not the mother.

Reproductive health: Reproductive health is defined as a state of physical, mental and social well being of a person in allmatters relating to the reproductive system at all stages of life. The important conditions to maintain good reproductive health during adolescence are as under;

1. To eat balanced diet.
2. To maintain personal hygiene.
3. To take adequate physical exercise.
4. To avoid taking any drugs.

1. *Nutritional needs for adolescents:-* The diet of adolescents should be a balanced diet which shouldinclude food items made from cereals, which provide carbohydrates for energy. It should also include fats for giving energy. It should also include food items containing proteins, vitamins and minerals which are required for the growth of body and keeping good health.
2. *Personal hygiene for adolescents:-*The maintenance of personal hygiene is necessary for adolescents for preventing diseases and keeping good health. Adolescent boys and girls should take bath regularly. It removes sweat oil and dirt and cleans the body. Adolescent girls should take special care of cleanliness during the time of menstrual flow.
3. *Physical exercise for adolescents:*Adolescents should do physical exercise such as brisk walking, cycling, playing outdoor games etc. it keeps their body fresh, improves mental health, protects a person from heart disease, high blood pressure, diabetes and obesity. It improves one's efficiency in studies, sports and work and it also improves the general sense of well being and makes a person feel happier.
4. *No drugs for adolescents:-* Drugs are the chemical substances which when taken into the body changes the functions of the body, influence the mind and sometimes even change the behaviour of aperson.
   Adolescents should avoid taking drugs at any cost as there are many harmful effects of taking drugs.And some of the harmful effects of taking drugs are:-

a) Drugs are addictive.
b) Drugs addicts become irritable and lose interest in their studies and jobs.
c) Drugs can do physical harm to the body. i.e. it can damage brain, liver , kidneys and lungs.
d) Drugs increase the risk of accidents.
e) The sharing of syringes for injecting drugs spreads AIDS among the drug addicts.

Role of Hormones in completing the life history of frogs and insects:

In a frog, the tadpole or larva hatched from the egg passes through certain stages to become a frog. The change from tadpole to adult frog is called Metamorphosis. In a frog metamorphosis is brought about by the thyroxine hormone produced by the thyroid gland. The production of thyroxine hormone requires the presence of iodine in water. All the amphibians need thyroxin hormone to undergometamorphosis and change from larva into adult.

Similarly all the insects undergo metamorphosis to change from larva into adult. And the process of metamorphosis in insects is controlled by insect hormones which are made in their endocrine glands.

Textual Questions

1. *What is the term used for secretions of endocrine glands responsible for changes taking place in the body?*
   a. Hormones

2. *Define adolescence.*
    a. The period of life, when the body undergoes changes, leading to reproductive maturity is called adolescence.
3. *What is menstruation? Explain.*
a. Infemales the ova begins to mature with the on-set of puberty. One ovum matures and is released by'the ovaries once in about 28 to 30 days. During this period, the wall of the uterus becomes thick so as to receive the egg, in case it is fertilized and begins to develop. This is known as pregnancy. If fertilization does not occur, the unfertilized egg, and the thickened lining of the uteruswith its blood vessels are shed off. This causes bleeding in women which is called menstruation.
4. *List changes in the body that take place at puberty.*
a. The changes in the body that take place at puberty are:
    i. Increase in height.
    ii. Change in body shape.
    iii. Change in voice.
    iv. Increased activity of sweat and sebaceous glands.
    v. Development of sex organs.
    vi. Production of hormones.
    vii. Reaching mental, intellectual and emotional maturity.
5. *What are sex hormones? Why are they named so? State their function.*

Sex hormones are the hormones that are produced by sex organs i.e. Testes and ovaries.
The testes produce the male sex hormone called testosterone and the ovaries produce the sex hormone called estrogen.
Functionof testosterone is to promote sperm production and help in the development of secondary characters and the function of ovaries is to promote egg formation and help in the development of secondary sexual characters.

6. *Choosethe correct option:* Do it yourself

7. *Write notes on:*

a)Adam's apple
b)Secondary sexual characters
c)Sex determination in the unborn baby

a) *Adam's Apple*:-This is the protruding part of the throat in boys which begins to grow at puberty. This is also known as larynx or voice box.

b) Refer to page 2

c) *Sex determination in the unborn baby*: - All human beings have 23 pairs of chromosomes as the name X and Y, female has two X chromosomes and male has one X and one Y chromosome.. When a sperm containing X chromosome fertilizes the egg, the zygote will have two X chromosomes and will

develop into a female child. If the sperm contributes a Y chromosome to the egg (ovum) al fertilization, the zygote will develop into a male child.

Biology

Topic: Food Production & Management

Agriculture: It is derived from two Latin words Ager-land, Cultura- cultivation so agriculture means cultivation of crops. The branch of science that deals with the growth of plants and animals for human use is called agriculture.

Agriculture includes four main processes:

i) Cultivation of soil which is called as soil management.

ii) Growing and harvesting of crops which is called crop farming.

iii) Growing and harvesting of vegetables, fruits, flowers and decorative plants which is called *Horticulture*:

iv) Breeding and raising of livestock including poultry called animal husbandry.

Crop plants or crops:The plants of same kind grown and tended in a field on large scale to obtain foods like cereals, pulses, vegetables, fruits etc. is called crop. These are of three types :

Cash crops: These are those crops that are cultivated for commercial purposes e.g. coffee.

Catch crops: These are those crops that are grown in between two main crops e.g. radish, carrot, peas, etc.

Cover crops:- These are the crops which are grown in order to maintain the fertility of the soil e.g. leguminous plants.

Depending upon the crops there are two main seasons:

1) Rabi season 2) Kharif season

The crops grown in Kharif season are called Kharif crops and the crops grown in rabi season are called Rabi crops.

Kharif crops:- These are those crops that are sown at the beginning of the monsoons i.e.in the month of June and July and harvesting is done in September and October after the monsoon rains are over. They require lot of water e.g. rice, maize, cotton, ground nut etc.

Rabi crops:- These are those crops that .are grown between October and December i.e. in the beginning of winters and are harvested after winter in March or April. These do not require a lot of water e.g. wheat, barley, gram, mustard, potato, etc.

Methods of agriculture/ Basic practices of crop production:- The various tasks

performed by a farmer to produce a good crop are called agricultural practices. The various agricultural practices are:-

1) Preparation of soil

a) Ploughing b) Levelling c)Adding manures and fertilizers

2)Sowing

3)Adding manures and fertilizers

4) Irrigation

5) Weeding

6)Protection of crops from pests and other organisms.

7) Harvesting, threshing and winnowing.

8) Storage

Preparation of soil: The soil is prepared for sowing the seeds of the crops by

Ploughing

Leveling

Manuring

1) *Ploughing (digging or tilling):-*

The process of loosening and turning the soil with the help of ploughs, is called ploughing. The implements that we use for small areas are spade, shovels, hoe, etc. ploughing pulled by a pairs of bullocks and tractors are used for large areas.

Functions of ploughing:

1. It looses up the soil for proper aeration and allows the roots to breathe easily.
2. It allows the plant roots to penetrate deeper into the soil.
3. Loose soil mixes fertilizers uniformly.
4. It brings the nutrient rich soil to the top so that the plants can use these nutrients.
5. It helps in the growth of soil organisms such as earth worms, millipedes, bacteria and fungi.
6. It helps in uprooting the weeds.
7. It exposes the soil pests to natural predators.

Q) Why are earth worms called as farmer's friend'?

a) Earth worms are called as "farmer's friends" because they ensure aeration of the soil. Their waste and the decay of dead organisms also help in manuring the soil.

Levelling:- The process of making the soil surface uniform is called levelling. In this process, big pieces of soil called crumbs are broken down into smaller pieces for proper germination. It is done by making use of a wooden plank or an iron leveller.

Advantages ofleveling:

1. It breaks the crumbs into smaller pieces for proper germination.
2. It protects the upper fertile layer from erosion.
3. It provides uniform irrigation.

Manuring:- Manuring means adding manures to the soil. Manure contains many nutrients required for the growth of crop plant. So, manuring is done to increase the fertility of the soil before seeds are sown into it.

Once the soil is ploughed, levelled and manured, it is ready for sowing of seeds. The soil is watered before sowing.

Sowing:- The process of putting or scattering the seeds into the soil for growing the crop plants is called sowing.

Quality of seeds:

1. The seeds that are chosen should be of good quality.
2. They should be healthy.
3. They should be disease resistant.
4. They should be free-from diseases.
5. They should -be high yielding.

Precautions for sowing seeds:

1. Seeds should be placed at a correct depth.
2. Seeds should be planted at a right distance.
3. Soil should have enough water.

Methods of sowing:

There are three methods of sowing:

1. Broadcasting
2. Seed Drill
3. Transplantation

1) *Broadcasting*:- It is a traditional method of sowing the seeds in which seeds are sown manually by hand.

Disadvantages of broadcasting:

v. It does not ensure proper spacing or proper depth of the seeds.

vi. The seeds scattered on the surface of the soil for sowing can be picked up and eaten by the birds easily.

2) *Seed Drill*:- It is along iron tube having a funnel shaped opening leading to long tubes. It is tied to the back of a plough and seeds are put into the funnel. The drill deposits seeds at regular interval which ensures more accurate sowing of seeds.

Advantages of sowing with a seed drill:

1. Seeds are sown at correct depth and correct intervals. The seeds sown are in regular rows.

2. The seeds get covered by soil and hence these seeds cannot be picked up and eaten by birds.
3. Sowing by using a seed drill saves time and labour.

3) *Transplantation*:- The process of transferring the seedlings from the nurseries or seeds beds to the main field.

Advantages of Transplantation:

1. It helps the farmers to select the healthy seedlings and space them properly while planting. This results in increase in crop yield.
2. It allows better penetration of the roots in the soil. It promotes better development of the shoot system of plants.

Applying manures and fertilizers: The deficiency of plant nutrients and organic matter in the soil is made up by adding manures and fertilizers to the soil.

Manures:- We add the manures and fertilizers in order to replenish nutrients. These are the organic substances obtained by the decomposition of plants, animals and their waste which supplies essential elements and humus to the soil and makes it more fertile. These are formed of three elements i.e. carbon, hydrogen and oxygen. Carbon is present in large amount. There are three types of manures:

Farm yard manures:- Those manures which we get after decomposition of animal dung or leaves or straw are called farm yard manures.

Compost manures:- These are those manures which we get after decomposition of dead plants, clay, dead animals, urine of animals, mud etc. These are kept in layers for 5-6 months and then compost manures are obtained.

Green manure:- These are those manures which are obtained by the decomposition of leguminous plants e.g. peas, beans etc.

Advantages of manuring:

1. It enriches the soil with nutrients.
2. It adds organic matter to the soil which improves the quality of the soil.
3. It increases the water holding capacity of the soil.
4. It increases the population of useful micro-organism.
5. It improves and maintains the quality of the soil.

Fertilizers: A fertilizer is a manmade inorganic compound which supplies specific nutrients to the soil. It is a salt or an organic compound containing the necessary plant nutrients to make the soil more fertile. The most commonly used fertilizers are NPK (Nitrogen, phosphorous, potassium) fertilizers.

Fertilizers have been very popular with farmers because most of them are water soluble and can be absorbed by the plants easily. These are also very easy to handle and store.

Fertilizers are applied either by broadcasting or by spraying or through irrigation channels.
Examples are: Ammonium sulphate, super phosphate, potassium nitrate, urea etc.

Manures	Fertilizers
Manures are organic in nature.	Fertilizers are inorganic in nature.
They are rich in organic nutrients but not rich in NPK.	They are rich in NPK.
They restore the texture of soil for better retention of water.	They cannot do this.
They are voluminous and so difficult to store and transport.	They are in concentrated form and are easy to transport but proper precautions should be taken while storing.
They are not soluble in water and so are absorbed very slowly by plants.	It readily dissolves in water and is quickly absorbed.
They are not nutrient specific.	They are nutrient specific and so can be selected to restore deficiency of specific nutrients in the soil.
Excessive use does not harm the soil texture. They provide humus to the soil.	Excessive use can change the chemical composition of the soil and hence pollute water.

Disadvantages of excessive use of fertilizers:

IV. The excessive use of fertilizers changes the chemical nature of soil and makes the soil less fertile.
V. The excessive use of fertilizers causes water pollution in ponds, lakes and rivers etc.
VI. The application of too much fertilizers result in the leeching of nitrates and phosphates into rivers, lakes etc. Phosphates and nitrates cause "Eutrophication".

Eutrophication:- It is the condition where the nitrate sand phosphates increase the growth of algae to produce algal bloom. This uses up oxygen and encourages aerobic bacterial growth and thus kills other aquatic animals.
Nitrates in the ground water find their way into drinking water. These compounds are cancer causing. Nitrates oxide the iron in haemoglobin and thus haemoglobin is no longer able to combine with Oxygen which leads to the

oxygen deficiency in the body. The extreme form of nitrate poisoning is "Blue-baby-syndrome" in which the body turns blue due to the lack of oxygen.

Irrigation: The process of supplying water to crop plants in the fields is called irrigation.

Advantages of irrigation:

i. Irrigation before ploughing the fields makes the soil soft due to which ploughing of fields becomes easier.
ii. It is necessary to' provide moisture for the germinations of seeds.
iii. It is necessary to maintain the moisture of soil for healthy crop growth so as to get good yield. It is necessary for the absorption of nutrients by the plants from the soil.

Sources of irrigation:- We can irrigate our fields in two different ways:-

I) Traditional methods
II) Modern methods

Traditional methods:- These are the primitive and ancient methods. Irrigation facilities are not well developed. The various traditional methods of irrigation are:-

a) Moat (Pulley system)
b) Chain pump.
c) Dhekli and
d) Rahat (Lever system).

Modern methods:- These are the methods in which advanced technology is used. Irrigation facilities are well developed. The modern methods of irrigation help us to use water economically by preventing its wastage. There are four types methods of modern irrigation

1) Furrow irrigation
2) Basin irrigation
3) Sprinkler irrigation
4) Drip irrigation

1) *Furrow irrigation*:- In this type of irrigation furrow or channels are made in between the crop rows and water is put in them. Since all the channels are interconnected, water reaches to every crop.

2) *Basin irrigation*:- In this method water is kept in fields as such so that the crops get sufficient water.

3) *Sprinkler irrigation*: In this method of irrigation fountain or sprinklers are used at particular distances for watering the plants.

4) *Drip/Trickle/Micro-irrigation*:- In this method, a pipe is connected to a water reservoir and various small channels are taken out from the pipe in such a way that their ends reach the bases of the crop (so for 1 crop there is 1 end) and valves are fixed at specific intervals. When the crops need to be irrigated, these valves are opened and water thus reaches to the crops.

Advantages of drip irrigation

I) It prevents wastage of water.

II) It prevents water logging.
III) It minimizes the use of water in agriculture. So, drip irrigation is very useful in those areas where the availability of water is poor.
IV) The time and frequency of irrigation depends on types of soils, crops and seasons or we can say that it varies from soil-to-soil, crop-to-crop and season-to-season.

Crop to crop:- Rice fields need stagnant water before sowing till harvesting while maize needs less water.
Soil to soil:- Clayey soil can retain water while as in sandy soil water seeps down to fit bottom and thus crops can't grow in it.
Season-to-season:- In summer season, plants need to be watered twice a day as the water evaporates quickly whereas in winter, plants, get water naturally from rains and snow.
Disadvantages of excessive/untimely irrigation:
Excess of water i.e. water logging inhabits the process of germination of seeds as the seeds do not get sufficient air to respire.

I) If the crop is irrigated when fully mature, it gets damaged.
II) It leads to wastage of water.
III) It turns the field into marshy area.
IV) Due to water logging flowers wither and fruits become rotten.

Weeding: The process of removal of weeds is called weeding.
Weeds:- The unwanted plants that grow along with the main crop (of their own) are called weeds. The weeds compete with the crops i.e. they compete with the nutrients, food, water, sunlight, air etc supplied to the crops.
Examples of weeds:

I) Parthenium
II) Amaranthus
III) Chenopodium
IV) Wildoats
V) Grass

The best time for the removal of weeds is before they produce flowers and seeds. We remove the weeds either by pulling them out or with using a trowel (Khurpa) or by destroying the weeds by spaying special chemicals called weedicides.
Weedicides:- The poisonous chemicals which destroy the weeds only without harming maincrop.The another name of weedicides is herbicides.
Examples of Weedicides:

I) Dalapon
II) Siniazine

III) Picloram
IV) 2,4-D
V) Butachlor

Steps to take while using weedicides

9. The person spraying the weedicides must cover his nose and mouth because if the vapour of weedicides enter the body of a person they may lead to the death of the person. They are toxic in nature.
10. We should wash the obtained grains thoroughly before consuming so that if any weedicide is left, it will be washed off.

Protection of Crops: Crops are to be protected from pests by spraying pesticides.

Pests:These are the organisms that destroy our crops are called pests.

Pesticides:- The chemicals that are used to destroy pests.

Examples of Pests:- Rodents (rats), insects (weevil, locusts terminates) micro organisms.

1. It is observed that 10% of our crop yield is destroyed by pests.
2. The 80% of sugarcane cultivation is destroyed by locusts.
3. Termites enter the plants and make them hollow.

Micro-organisms: They also destroy our plants e.g. Smut is a disease caused by fungi wheat, wilt, is caused by bacteria etc.

There are two methods to remove the pests:

1. Chemical control
2. Biological control

Chemical control: We spray the chemicals on the ground or to the field. It can be done by:

1) Hand operating machine 2) Low lying air crafts.

In chemical control we use pesticides which include:-

Insecticides:- They kill insects e.g. DDT (Dichlorodiphenyl Trichloroethane), BHC (Benzene hexachloride) Commonly called gamaxene, Malathion etc.

Fungicides:- Chemicals that are used to destroy fungi e.g. sulphur and copper salts.

Rodenticides:- The chemicals that are used to kill rodents are called rodenticides e.g. Zinc phosphide, Warfarin.

Biological control: In biological control, we make use of another organism which kills the pests.

Advantages and Disadvantages of using pesticides:

Advantages:

1. They kill pests quickly.
2. These increase food production by killing pests.

3. They are easy to store and use.

Disadvantages:

1. Pests can develop resistance to a particular pesticide.
2. The spray can effect wildlife when sprayed in a particular area.
3. Pesticides can seep into the soil and drain into rivers and lakes and pollute the water.
4. They can enter the food chain and build up from one feeding level to another feeding level and can reach a toxic level. Being toxic, they irritate the skin and effect the respiratory system of human being.

Harvesting, Threshing and Winnowing:-

Harvesting:

It is the process of cutting and gathering of mature crops. In harvesting, the crops cut close to the ground by hand using a cutting tool called sickle. This is called manual harvesting. It is done in small areas. However, in large fields, crops are cut by a motorized machine called harvester.

Threshing:-

It is the process of separating the grain from harvested crops. It is done to take the grains from its outer covering called chaff.

1) In traditional method of threshing, the harvested crop is spread on the ground in a small area and various cattle like oxen, cows, buffaloes are made to walk over it again and again.
2) Beat the crops against wooden logs which also help in separating grains from crops.
3) In larger farms, a motorized machine called thresher is used.

Winnowing

It is the process of separating the grains from chaff and hay. This can be done by means of wind. Here we drop the grains from a certain height and the grains being heavier fall directly towards the ground while as hay being lighter is carried away by wind and they make a separate heap. Then the grains bearing hard cover are difficult to separate from cover. So, the separate processing of those grains is carried in industries or factories using special machines. The grains are put in machines where they are separated from the hard cover and after reaching the end part of the machine a big fan is kept to easily throw away the hard separated cover. In this way the grains are completely made clean and free from dust and other waste materials. These days combines are being used in large farms for harvesting, threshing and winnowing. A combine is a huge machine which cuts the standing crops, threshes it and separates the chaff from grain in one operation.

Storage of food grains:

The food grains obtained by harvesting the crops are dried in the sunshine before storing to reduce their moisture. It is necessary to prevent their spoilage during storage because the higher moisture content in the food grains promotes the growth of fungus and moulds the stored grains. The farmers store the dried food grains at home in metal bins and the bags. Dried neem leaves are used for storing food grains at homes, large scale storage of food grains is done in two ways:

1) In gunny bags
2) In grain silos

The most common method of storing food grain on large scale is to fill them in gunny bags, stitch the mouth of gunny bags tightly, and keep these gunny bags one over the other in big godowns. Pesticide solutions are sprayed on the stacked gunny bags in the godown from time to time.
Grain silos are also used for storing food grains on large scale. The grain silos are specially designed big and tall cylindrical structures which have inbuilt arrangements for protection of stored food grains from pests and micro-organisms.
Plant breeding:- The science of improving the genotype (the genetic make-up) of plants by improving their genetic capacity is called plant breeding.
There are 4 main plant breeding techniques:
i) *Introduction*:- The seeds of a plant species having some special features are brought from some other place and .grown in a 'new place where it was not grown before. This is called introduction.
ii) *Selection*:- Selection is the oldest method of crop improvement. During selection, the individual plants or groups of plants having the desired characters are picked up from a population and eliminating the undesirable ones. These selected plants are allowed to reproduce.
Selection of plant species is done for useful characters such as disease resistance response to fertilizers, product quality and quantity.
iii) *Hybridisation*:- It is a technique of plant breeding in which two plants having desired characters are made to cross and develop seeds. During this process, one plant is considered as male and the other is considered as female. The stigma of the female plant is dusted with the pollen grains of the male plant. After pollination, the fusion of desired male and female gametes produce embryo having the characters of both the plants.
iv) *Genetic engineering*:- It involves the transfer of one or more genes from one plant to another. The plant in which the foreign gene has been produced is called genetically modified plant.
Aims and Objectives of plant breeding;
High yield and improved quality: Plant breeding techniques are used lo increase the productivity and to improve the quality of the plant i.e. to make them disease resistant etc. •
Biotic and abiotic resistance:- Under natural conditions, the crop plants are prone to certain biotic and abiotic stresses. Biotic stress includes diseases caused by bacteria, fungi etc. abiotic stress includes damage caused due to flood, frost, heat, salinity, hail etc. Plant breeders try to develop varieties which are resistant to the stresses.
Desirable characters:- Plants are grown according to our needs. Plant breeders try to develop the varieties with desirable characters such as high yield, disease resistant.
Development of new (novel) varieties: Seedless tomatoes, stoneless plums and peaches are some of the products that are available to us through the advent of plant breeding technique.
Soil Improvement:- After the land has been cultivated for a long time, soil nutrients are

used up. One of the methods of replenishing the nutrients is to add manures and fertilizers. Some other natural methods are as follows:
Fallow method:- The old method of allowing the soil to replenish the lost nutrients was to leave it free for one or more seasons. The decomposition of dead plants and animals replenish the lost nutrients. However, due to high demand of food grains this method is no longer followed.
Crop rotation:- Each crop uses more of one element and less of another. Some farmers alternate crops so that land is not drained of any one nutrient. This is called crop rotation e.g. after a season of growing rice which uses up nitrogen in the soil, a leguminious plant can be grown which regenerates nitrogen in the soil.

Advantages of crop rotation:

1. It reduces the need of fertilizers.
2. Several crops may be grown in succession with only one soil preparation.
3. It controls pests and weeds.
4. By this method, the soil is utilized completely.

Mixed or multiple cropping:- Sometimes two or more crops are grown in the same field. If the crops are chosen properly the products and waste materials of one crop help, in the growth of other crop and vice versa e.g. cotton and groundnut are grown together.
Advantages of multiple cropping:

1. The risk of total crop failure due to uncertain monsoon is reduced.
2. Farmers tend to harvest a variety of products at the same time.
3. Fertility of the soil is improved.
4. Chances of pest infections are greatly reduced.

Intercropping: It is the process of growing two or more crops simultaneously in a same field in definite row pattern with the objectives of increasing productivity per unit area. The practice of intercropping is adopted by farmers where they have least access to irrigation, it is the improved version of mixed cropping.
Advantages of intercropping:

1. It makes better use of natural resources.
2. Soil erosion is effectively arrested.
3. Different crop that are grown are harvested and threshed separately.
4. The product of each crop can be marketed and consumed separately.

Differentiate between Mixed cropping and Intercropping:

Mixed Cropping	*Intercropping*
It has target to minimize risk of crop failure.	It has target production to increase per unit area.
Seeds of two crops are mixed before sowing. It involves no definite pattern of rows	Seeds of two crops are not mixed. It involves a definite pattern of

of crops.	crops.
Threshing and harvesting is not done separately.	Threshing and harvesting is done separately.

Dairying: An establishment where milk and cream are kept and butter and cheese are made is known as a "DAIRY". The business of dairy is called dairying. The most important dairying areas of the world are in Western Europe, North America and the temperate parts of the Southern Continents.' The leading producers of cow-milk are India, USA, Russia and Germany. India, Sudan and China are the leading producers of buffalo milk. The leading producers of cheese are USA,France and Germany and that of butter and ghee are India, USA and Germany.
Man has been keeping animals since times immemorial. We keep some animals for specific purposes. For instance, milk and milk products are obtained from cattle.
Horses, camels and bullocks are used for transportation. Bullocks are also used in agriculture. Cattle dung is used as manure.Also,animal skin is utilized for making a variety of leather goods. Sheep are used for wool and meat. Dog has been used by man for a variety of purposes, like security, and company as a pet.
Animals provide us milk, egg, meat, honey, silk and a number of other useful products. The animals like crops are raised on a large scale in "Farms" Milk-yielding animals are called the Milch animals e.g. cow, buffalo, goat etc. We get milk from them which is used to prepare various foods like butter, curd, cheese, ghee. etc. The keeping of animals for specific purposes is known as "Domestication". All domestic useful animals constitute the "Live stock". Cattle, buffaloes, sheep, pigs and camels constitute the live stock wealth of our country. "Animal husbandry" is the field dealing with the study of food, shelter and health care of domestic animals.
Feeding:- The feed normally given in a dairy farm is a mixture of ordinary grass and a legume with clover.
Heeding:- The proper care, maintenance and management of animals is called as heeding". The health of a live stock is maintained with the proper caring .day and night. Some very simple practices are followed by farmers for caring their animals. These are:

1. Providing the animals food regularly and properly.
2. Erecting the sheds away from human habitations to maintain sanitary conditions and cleaning the sheds regularly.
3. Cleaning the animals regularly.
4. Watching the animals carefully to see if they are normal and healthy.
5. Taking precautions against infections and some diseases like foot and mouth disease, cow pox, tuberculosis, anthrax (Splenic fever).
6. Working calmly and treating them gently and not frightening the animals.
7. Performing regular checkups of the animals by specialists called veterinary doctors.

Poultry:- The term poultry refers to chickens, ducks, turkeys, geese, swans, guinea fowl, pigeons, ostriches, and other game birds. In India, chicken is the most common

domestic bird. Thus, the practice of keeping and breeding of useful animals which provide meat and egg is called as "Poultry".
Fowl may be classified on the basis of utility, economic value and these include

a) Meat Type (b) Egg Type (c) Dual purpose (d) Game (e) Ornamental and (f) Bantam. They are further classified on the basis of
(i) Class (ii) Breed (iii) Variety, and (iv) Strain.

Poultry Feed: The common feed of poultry chicken includes grains, oil-cakes, green-feed and limestone. Limestone helps in the digestion of food and in the formation of egg shells. For proper egg production, a lot of water is needed by the poultry birds. Domestication of group of birds such as chickens, geese, turkey and duck for the purpose of obtaining eggs and meat from them is known as "Poultry- Farming"
Poultry Housing:- Proper housing for the birds is must in poultry farming. Following joints should be kept in mind while housing the birds.

a) The shelter for poultry birds should be comfortable and safe.
b) They should be provided with well- ventilated, dry, properly lighted houses.
c) Birds of different ages should be kept separately.
d) The birds should be protected from the cold winds and heavy rains.
e) The houses (pens) are generally made of metal or wood because mud houses may be attacked by rats or snakes.
f) The houses should be regularly cleaned and cleared of excreta and decaying vegetable materials.
g) Good drainage system is must to keep the poultry clean.

Egg Laying: Hen starts laying egg when about six months old. The egg laying bird is known as "Broody hen".
An egg needs to be hatched to develop and grow into a chick. In nature, the mother hen sits on the eggs and keeps them warm. This is known as "Incubation". Warmth so provided aids in hatching.
In poultry farms, hatching is done in "Incubators" called "Hatcheries". The egg hatches in 21days.
Protective Measures against Disease: Poultry birds suffer from diseases such as fowl cholera, chickenpox and rani-khet. These diseases can be fatal. Besides these, the birds may get infected with various internal and external parasites. As a preventive measure vaccination and drugs should be given and the infected birds should be separated from the rest.
A broiler is a young chicken that grows very fast and can be marketed at the age of 8 to12 weeks. It attains about 1.5 kg live weight within this period.
Fisherie s(Pisciculture):
Rearing and management of fish on a large scale is known as "fisheries". The Indian subcontinent is surrounded on three sides by water and the coastal area provides a rich haul fish. They are a major source of animal protein. Now-a-days, fish are cultivated on industrial scale in large water-reservoirs.
Fishery is flourishing industry in our country. Prawns, lobsters, shrimps and edible

Oysters are exported on a large-scale. Fish not only provide protein but the oil of the fish can be used for various purposes. Corals are used as decoration pieces. Pearls from oysters are used in jewellery. Some important fishes are Catla, Labeo, Scoliodon, Barbus, Ray fishes and Tuna cod. Marine fishes found in India are Hilsa, Sardine and Mackerel etc.

Fishes Found In Jammu and Kashmir:- A variety of fishes are found in Jammu and Kashmir state. There are 35-species of fish found in the Kashmir valley alone. The Jammu and Kashmir fisheries department has introduced following carps and trouts in ponds and streams of J&K:-

a) Rohu (Labeo rohita)
b) Mrigal (Cirhina mrigal)
c) Brown trout
d) Grass carp.
e) Rainbow trout.
f) Scale carp.
g) Mahseer etc.

Important fish farms in J&K state are: Harwan, Achabal, Kokernag, Laribal , Daachgam, Manasbal. etc.

The pollution of water causes great harm to the fish. This is very serious problem for the farmers because the fish dies when water body gets polluted. In order to maintain a fish regular monitoring of the level of oxygen and carbon dioxide is essential.

Honey bee-- Apis (Apiculture):

Honey bees are social insects known for producing honey and the bees wax, and for living in very highly organized colonies. These feed upon nectar and pollens of flowers. Sucking and chewing mouth parts and undergo complete metamorphosis. Each colony has its own nest called honey comb or beehive. Apiculture is the practice of keeping beehives and rearing honey bees to get honey and wax. Honey is an essential ingredient of many medicines. Wax is also of great value. The place used for rearing of honey bees is called an apiary. Honey is extracted by a honey extractor. It contains 17% and 78% sugar with minerals and enzymes which help in digestion of food. Honey supplies millions of kilograms of honey and beeswax. Beewax is used in making candies, creams, polish, cosmetics etc. Honey is a natural antiseptic and valuable tonic for human body. It prevents infection if applied to a wound. It is also used to cure ulcers. A number of Ayurvedic medicines are taken with honey. Each beehive harbours a colony of thousands of polymorphic bees, all belonging to a single family. The polymorphic individuals are of three main types:

a) A single queen (fertile female)
b) One to a few hundred drones (fertile males)
c) Thousands of worker bees (sterile females)

Queen: She is the Supreme being in a colony because all the main activities in the hive revolve around her. She normally lives about five years and does nothing except laying eggs. She lays about 15 lakh eggs during her life time. Normally 1000-3000

eggs are laid per day.

Drones:- These are quite smaller but stouter than the queen with broader abdomen higher appendages and larger wings, brain and eyes. These also lack salivary and wax glands and depends for food upon worker bees. These even lack a sting and hence have defense. During breeding season, drones are well fed by the workers and can be often flying near the hive, chasing and mating with young queens in flight. After mating they are made to leave the hive to save honey.

Workers:- These are considerably darker and smaller but most robust with strongest mouth parts and well developed wings. Their body is densely covered with hair like bristles. They are females which develop from fertilized eggs but they cannot reproduce.

Textual Book Questions

Q) Name the following............

Ans) Five requirements essential for obtaining good crop productions are:

a) Right kind of soil.
   a. Good quality of seeds
   b. Required amount of water
   c. Protection from weeds and pests
   d. Proper implements
b) Two types o f fertilizers are:
   a. Urea
   b. NPK fertilizers
c) Chemicals used to protect crops from insects, pests and weeds are
   a. Insecticides (Pesticides)- Malthion- Dimecron-poly thion
   b. Weedicides:-2, 4- D/ siniazine
d) Animal products are:
   a. Meat, milk, eggs, honey, silk, wool, wax etc.
e) Members of colony of bees are:
   a. Workers (sterile females)
   b. Drones (fertile males)
   c. Queens (Fertile females)

Q2) Fill in the blanks: Do it yourself

Q3) Answer the following question in only one word or in figure:

1. What is the process of turning and loosening the soil called?
   a. Ploughing
2. Which implements is used for tilling soil?
   a. Ploughs
3. Which implements is used for breaking up the large lumps of soil?
   a. Wooden plank or iron leveller
4. What is the implement used for sowing called?
   a. Seed drill
5. What is the top part of the drill called?

   a. Seed bowl
6. What is an egg laying bird called?
   a. Broody hen
7. Name the members of bee colony?
   a. Worker drone and queen
8. Which material is used to cover the floor of a hen house?
   a. Straw
9. Which is the common food of poultry chicken?
   a. Grains
10. Which bee is responsible for laying eggs?
   a. Queen bee

Q4) Give the scientific reason for the following:

a) Grains, pulses, vegetables and fruits should be used in our daily life?
   a. These form the constituents of the balanced diet for maintaining the proper well being of the man's body.

b) The soil should be loosened before seeds are sown?

A) Loosened soil is better ventilated and suitable for the growth of tiny plant living in it, it also allows the roots to penetrate freely and deeper.

Q) Seeds should be sown at a proper depth in the soil?

A) Because, if they are sown too deep, they will be able to germinate and are sown at a shallow depth, then they will be eaten by birds and animals.

Q) Fruits and vegetables should be washed thoroughly before eating?

A) Because, they have a coating of pesticides, otherwise they are harmful to our body.

Q) Grains are dried thoroughly before they are stored?

A) Grains are dried thoroughly before storing because moisture and humidity promotes the growth of fungi or moulds on grains. Some of these micro-organism are poisonous.

Q) Answer the following questions:

i) What are the requirements of farming which would lead to high yields of crops?

A. The basic requirements for growing a crop in an area are as follows:

a) proper types of soil b) use of manures c)irrigation d) Better varieties of seeds e) agricultural tools f) Chemicals to prevent diseases of the plant crop

Q) What is tilling? How is it done?

A)*Tilling or ploughing:* The process of loosening and turning the soil is called tilling or ploughing. For ploughing the soil various types of ploughs are used

Plough: This is being used for tilling of soil, adding fertilizers to the crop, removing the feeds, scrapping of soil etc. It is made of wood and drawn by a pair of bulls. It contains a strong triangular iron strip called plough. The main part of plough is log of wood which is called as plough shaft. There is a handle on one end. The other end is attached a beam, which is hung on the neck of bulls. One pair of bulls and a man can easily operate the plough.

iii) Write a short note on the process of "Sowing"
A) Sowing:- It is the process of putting seeds in the soil. There are two methods of sowing of seeds.
Broad Casting:- The sowing of seeds is done manually by spraying in the field is called broad casting.
Seed drill:- A seed drill consists of a vertical tube, with a Seed bowl. This arrangement is tied to the back of a plough. The drill deposits seeds at regular intervals which ensure more accurate sowing of seeds.

Term 2 8th biology

Biology

Topic: Reproduction in Animals

***Reproduction*:**

It is the process of production of new organisms from the existing organisms of same species. It is the creation of new living things from the existing ones.

Importance of reproduction:

1. Reproduction is essential for ensuring continuity of life on earth.
2. It gives rise to more organisms with the same basic characteristics as their parents.

Methods of reproduction-There are different ways in which new organisms are produced from their parents. All these different ways of reproduction can be divided into two main groups:

1. Asexual Reproduction
2. Sexual Reproduction

1. *Asexual reproduction*:- It is a type of reproduction in which a new organism is formed from a single parent without the involvement of gametes. It is called asexual reproduction because it does not use sex cells for producing a new organism. The organisms produced are the exact copies of their parents. It is usually seen in unicellular organisms and simple multicellular organisms. Some of the examples of asexual reproduction are fission, budding etc.
2. *Sexual reproduction*:- It is a type of reproduction in which new organisms are formed from two parents by making use of their gametes. In this reproduction, the sex cell of one parent fuses with the sex cell of other parent to form a new cell called zygote which then grows and develops to form a new organism. The offsprings produced are not the exact copies of parents. It is usually seen in multicellular organisms like humans, fish, frogs etc.

Gametes:-Sexual reproduction takes place by the combination of special reproductive cells called sex cells or gametes.So gametes can be defined as the cells involved in sexual reproduction. Gametes are of two types: male

gamete and female gamete. Male gamete in animals is called Sperm and the female gamete in animals is called egg or ovum.

Fertilization:-The process of fusion of male gamete i.e. sperm with the female gamete i.e., .ovum during sexual reproduction to form a zygote, is called fertilization. This zygote then changes over a period of time to form a new individual.

Types of fertilization:-Depending on whether fertilization takes place inside or outside the body of a female, fertilization is of two types:

a) Internal fertilization b) External fertilization

a. *Internal fertilization*: The fertilization which takes place inside the female body, is called internal fertilization. In internal fertilization, the male puts his sperms into the female's body and these sperms then fertilize the egg inside her body. This type of fertilization occurs in a very large number of animals such as humans, cows, dogs, cats, reptiles, insects etc.

External fertilization:-The fertilization which takes place outside the female body, is called external fertilization. In external fertilization, the male and female animals release their sperms and eggs in water where fertilization takes place by collisions between sperms and eggs. External fertilization is very common in aquatic animals such as frog, fish and star fish.

Sexual Reproduction in Animals:- Sexual reproduction is the most common method of Reproduction in animals. The whole process of sexual reproduction in animals involves the formation sperms and eggs, joining together of sperm and egg to form a fertilized egg called zygote, and growth and development of zygote to form an organism.

Sexual Reproduction in Humans:- In human beings, the reproductive system in males and females are different with different organs performing different functions.

Male Reproductive System:- The male reproductive system of humans consist of following organs:

a) Testes b) Scrotum c) Vas Deferens d) Urethra e)Penis

a) Testes: These are a pair of oval shaped organs which lie outside the abdominal cavity. Testes are the primary sex organs in males. The

function of the testes is to produce millions of sperms and male sex hormone (testosterone).

b)*Scrotum*:- It is a pouch of folded skin that hangs between the legs. It is divided internally into right and left scrotal sacs by muscular partition. The two testes lie in respective scrotal sacs. Scrotal sacs provide an optimum temperature for the formation of sperms. The sperms develop at a temperature 1-3°C lower than the body temperature.

c) *VasDeferens* (Sperm ducts):- These are two straight long tubes which connect each testes to the urethra. Sperms are temporary stored in vas deferens. It then carries the sperms to the urethra along with the secretions of reproductive glands and this mixture of sperms and secretions is called semen.

d) *Urethra*:- It is a long tube that arises from the urinary bladder. The two sperm ducts open into the urethra and pass through the penis. Urethra carries the sperms to the penis.

e) *Penis*:- It is a long muscular organ which is used for introducing the sperms into the vagina of the female during sexual intercourse. It is also used for passing out urine.

Female Reproduction System:- Female reproduction system consists of following organs:

a) A pair of ovaries b)A pair of fallopian tubes c) Uterus d) Vagina

a) A pair of ovaries: These are a pair of oval shaped organs which are located inside the abdominal cavity. These are the primary reproductive organs. The function of ovaries is to produce ova and female sex hormone i.e. estrogen and progesterone. Each ovary produces one mature ovum every month by a process called ovulation.

b) A pair of fallopian tubes or oviducts:- These are two long tubular structures which joins the ovaries with the uterus. These are not directly connected to ovaries but have funnel shaped openings which almost cover the ovaries. The ovum released by an ovary goes into the oviduct through its funnel shaped opening, the fertilization of ovum by a sperm takes place in the oviduct.

c) Uterus:- It is also called as womb. It is hollow, muscular, pear shaped organs. The growth and development of the baby takes place in the uterus. The narrow lower part of uterus is called cervix.
d) Vagina:- It is a long muscular tube. Uterus opens into the vagina through cervix. it receives the penis during sexual intercourse so that the sperms are discharged into the vagina.
Fertilization:- The process of fusion of sperm with the ovum is called fertilization. In humans, internal fertilization occurs in fallopian tubes. The ovum reaches the fallopian tube from the ovary. The sperms made in the testes of male are introduced by penis into the vagina of the female. The sperms enter into the vagina, pass through the uterus and reach oviducts. One of the sperms fuses with the ovum and forms a zygote. This is called fertilization.
Development of embryo:- The zygote divides repeatedly to form a ball of hundreds of cells. This is called embryo. The embryo moves down the oviduct into uterus and gets embedded in the soft and thick lining of the uterus. This process is called implantation. The embryo gets food and oxygen from the blood vessels in the lining of the uterus. The cells of embryo begin to form specialized groups that develop into different tissues and organs of the baby. Thus, an unborn baby at an early stage of development for upto 8 weeks after fertilization in the uterus is called an embryo. The body features of the embryo are not much developed at this stage.
The embryo gradually grows .and develops body parts such as hands, legs, head, eyes, ears, etc. An unborn baby in the uterus at this stage when all the body parts can be identified, is called foetus. From about eight weeks until birth, the unborn baby is called foetus. During this period of pregnancy, foetus takes its nourishment from mother through placenta or umbilical cord. The uterus increases in size as the foetus grows and the uterus is filled with the fluid called amniotic fluid that protects the foetus from all kinds of jerks, shocks and temperature changes. When the development of the foetus into a baby is complete, the mother gives birth to the baby fully formed baby comes out of the mother's body through vagina. This expelling out of the baby from mother's body is called parturation and this period between fertilization and parturation is called gestation which lasts for about 40 weeks in humans.

In Vitro fertilization:- In a healthy woman, fertilization of egg by the sperm takes place in the oviduct. The oviducts of some women are blocked due to some reasons such women cannot produce babies in the normal way. This problem can be solved by using the in-vitro fertilization technique. This technique is also called as in glass fertilization or test tube babies technique.

The invitro fertilization helps a woman with blocked oviducts in having babies as follows:

1. The doctor collects the freshly released egg from the ovary of the woman by operation.
2. The woman's husband provides the sperms in the form of semen.
3. The sperms are mixed with egg in a glass dish or a glass tube to carry out fertilization.
4. The fertilized egg or zygote develops into embryo.
5. After about a week, embryo is placed in the uterus of the woman. If embryo gets implanted in the uterus successfully, then normal pregnancy occurs and a baby is born after about nine months.

The babies born through in vitro fertilization technique are called test tube babies because fertilization takes place in a glass dish or a glass test tube.

*Viviparous and Oviparous Animals:-*Viviparous animals (ViVi-alivi; parous-bearing) Those animals which give birth to their young ones, are called viviparous animals. In viviparous animals, the young one develops in the uterus inside the body of the mother. When the young one is fully developed, mother gives birth due to which alive young one comes out of the mother's body. Some examples of viviparous animals are:- humans, cow, dog, cat, lion, tiger,

Oviparousanimals(ovi-related to eggs parous-bearing):- Those animals which lay eggs from which young ones (baby) are hatched later on, are called oviparous animals. In oviparous animals, the mother lays eggs outside its body. The young one of the animal develops inside the egg. When the development of young one inside the egg is complete the egg shell breaks-open and an alive young one comes out of it. This is called hatching. Some

examples of oviparous animals are:- Hen, crow, sparrow, lizard, snake, ostrich, crocodile etc.

Asexual Reproduction in Animals:-It is process of producing new organisms from a single parent without the involvement of gametes. The individuals formed are identical to their parents and are called as clones.

Asexual reproduction is of various types like fission, budding, regeneration, fragmentation, spore formation, vegetative propagation, tissue culture etc. The two common methods of asexual reproduction in animals are:

a) Fission b) Budding

a) *Fission*:- It is a type of asexual reproduction in which a parent organism splits or divides into two or more daughter cells. Fission begins with the division of nucleus (Karyokinesis) followed by the division of cytoplasm (cytokenesis) to form new organisms. It is usually seen in unicellular organisms.

Fission is of two types:

i) Binary fission ii) Multiple fission

Binary fission:- It is a type of fission in which parent organism divides into two daughter cells. This type of reproduction occurs under favourable conditions. This type of reproduction is usually seen in Amoeba, Paramecium, Leishmania etc.

Multiple fission: It is a type of fission in which parent organisms develops into many daughter cells. This type of fission occurs under unfavourable conditions and is usually seen in Plasmodium.

b) *Budding*:- It is a type of asexual reproduction in which a small part of the body of the parent organism grows out as a bud which then detaches and becomes a new organism. The asexual reproduction by budding is observed in animals like hydra, sea-anemones, sponges and corals.

Cloning: It is the production of an exact copy of an animal by means of asexual reproduction. The cloning of animals is a special kind of asexual reproduction. The cloning in animals is done by the transfer of nucleus of cell into an empty egg cell whose nucleus has been removed and then allowed to grow normally.

Cloning of Dolly sheep: Dolly sheep was the first mammal to be cloned. Dolly was born on 5 July, 1996 Dolly sheep was cloned in the following way:

i. A normal body cell was removed from the mammary gland of a female Finn Dorset sheep which was to be cloned.
ii. An unfertilized egg cell was taken from a female Scottish Blackface sheep and its nucleus was removed, leaving the egg cell empty.
iii. The nucleus of normal body cell of Finn Dorset sheep was inserted into the empty egg cell of Scottish Blackface sheep. In this way, a new egg cell was obtained.
iv. The new egg cell was implanted in the uterus of another female Scottish Blackface sheep making it pregnant. After 148 days, this pregnant Scottish Blackface sheep gave birth to Dolly sheep.

Dolly died on 14th February 2003 due to a lung disease.

Define the following terms:

Zygote:- It is a single cell formed by the fusion of male and female gamete and is the beginning of formation of a baby.

Embryo:- It is a multi-cellular unborn baby in the early stages of development upto 8 weeks in the uterus formed by the repeated division of zygote. The body features of growing baby are not developed.

Foetus:- It is formed by the growth and development of an embryo. It is an unborn baby in the uterus in the later stages of development (after 8 weeks till birth). The body features of developing baby can be identified.

Unisexual Organisms:- These are the organisms that produce only one type of gamete or sex cell, are called unisexual organisms e.g. dogs, humans, cats etc.

Bisexual organisms or hermaphrodite organisms:- These are the organisms that produce two types of gametes or sex cells, are called bisexual organisms e.g. 'earth worms, tapeworms, snails, etc.

Gestation: It is the period between fertilization and birth of a child.

Q) Explain the importance of reproduction in organisms.

A) Reproduction is very important for the organisms because it ensures the continuity of the species generation after generation.

Q) Describe the process of fertilization in human beings.

A)The first step in the process of reproduction is the fusion of a sperm and an ovum. For this to happen, millions of sperms from the male are transferred

into the female body. The sperms swim in the oviduct with the help of their tails to reach the egg. When they come in contact with the egg. One of the sperms fuses with the egg. Such fusion of the egg and the sperm is called Fertilization. During fertilization, the nuclei of the sperm and the egg fuse to form a single nucleus. This results in the formation of a fertilized egg or zygote.

Q) Give two differences between a zygote and a foetus.

zygote	Foetus
It is single celled.	It is multicellular.
Zygote is formed by the fusion of male and female gamete.	Foetus is formed by the repeated division of embryonic cells and their differentiation.

Q) Define asexual reproduction. Describe two methods of asexual reproduction in animals.

Already done (refer notes)

Q) In which female reproductive organ does the embryo get embedded?

A) Uterus

Q) What is metamorphosis? Give examples.

A) The drastic change that transforms a larva into an adult is called metamorphosis. Frog, Silk Worm, Honeybee are some animals which exhibit metamorphosis.

Q) Differentiate between internal fertilization and external fertilization.

Internal fertilization	*External fertilization*
It takes place inside the bodyof thefemale.	It takes place outside the body of the female.
Female lays either fertilized eggs or a complete individual is born.	Female lays unfertilized eggs.

(Additional Questions)

Q) Why aquatic organisms produce a large number of sperms and eggs?

A) Aquatic organisms produce a large number of sperms and eggs because the eggs and sperms get exposed to water movement wind and rainfall. Also there are other animals in the pond which may feed on these eggs. These factors prevent the sperms from reaching the eggs. Thus, the production of large number of eggs and sperms is necessary to ensure fertilization of at least a few of them.

Q) In how many ways, the new individuals are produced by their parents?

A) New individuals are-produced by their parents in following ways:

1. Some individuals hatch out of eggs, like chicks and snakes.

2. Some individuals are born from their mothers like kittens, puppies and human beings.
3. Some individuals grow of their parent's body or its parts e.g., hydra, yeast and onions.
4.Some individuals split into two or more individuals, e.g., amoeba and many bacteria.

Q) What are the test tube babies?

This technique is used when in oviducts of a female are blocked. These women are unable to bear babies because sperms cannot reach the egg for fertilization, in such cases, doctors collect freshly released egg and sperms and keep them together for a few hours for in vitro Fertilization (Fertilization outside the body). After the zygote develops for about a week, it is placed in the mother's uterus. Complete development takes place in the uterus and the baby is born like any other baby. Babies born through this technique are called 'test tube babies'. This is a misnomer (wrong name) and is misleading because babies cannot grow in test tubes.

Q) What is cloning? Discuss in brief the history of cloning.

Cloning is the production of an identical cell of any other living part, or a complete organism. Cloning of animals was successfully performed for the first time by Ian -Wilimut and his colleagues at the Roslin Institute in Edinburgh, Scotland. They cloned successfully a sheep named Dolly. -Dolly was born on 5th July. 1996 and was the first mammal to be cloned.

During the process of cloning Dolly, a cell was collected from the mammary gland of a female Finn Dorsett sheep. Simultaneously, an egg was obtained from a Scottish blackface ewe. The nucleus was removed from the egg. Then, the nucleus of the mammary gland cell from the Finn Dorsett sheep was inserted into the egg of the Scottish blackface ewe whose nucleus had been removed. The egg thus produced was implanted into the Scottish blackface ewe. Development of the egg followed normally and finally Dolly was born. Though Dolly was given birth by the Scottish blackface ewe, it was found to be identical to the Finn Dorsett sheep from which the nucleus was taken. Since the nucleus of the Scottish blackface ewe was removed, Dolly did not show any character of the Scottish blackface ewe. Dolly was a healthy clone and

produced several off-springs of her own through normal sexual means. Unfortunately, Dolly died on 14th February, 2003 due to a certain lung disease. Since Dolly, several attempts have been made to produce cloned mammals. However, many die before birth or die soon after birth. The cloned animals are also found to be born with severe abnormalities.